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**P AND PKP CODA DECAY CHARACTERISTICS
FOR EARTHQUAKES**

T. J. Cohen, et al

Teledyne Geotech

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P AND PKP CODA DECAY CHARACTERISTICS FOR EARTHQUAKES

T. J. COHEN

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SEISMIC DATA LABORATORY

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INTRODUCTION

In this report we examine coda characteristics for earthquakes from 15 seismic regions as recorded at 17 World Wide Standard Seismograph Station (WWSSS). Whenever possible, events with body wave magnitude $m_b \geq 6.0$ were examined, since the coda for large events stay above the ambient noise level for relatively longer time periods.

In this report, we present the average coda determinations and their standard deviations, and some general observations on coda characteristics. These data can be used, for example, to determine how often the signals from one event are masked in the coda of another event.

DATA

Using the list of seismic events compiled by the National Oceanic and Atmospheric Administration (NOAA), earthquakes with $m_b > 6.0$ were selected for each region shown in Figure 1 (Table I). Film chips of seismograms recorded for these events by 17 WWSSS stations (Figure 2, Table II) were then ordered from NOAA for study. For reasons related to seismogram quality and station outage, the original list of events was supplemented with events of $m_b < 6$. Summary lists of the events studied, together with the stations used with each event, are given in Tables III through XVII. Table XVIII summarizes the data analyzed by station, region, and phase (P or PKP).

ANALYSIS TECHNIQUES

The method used to determine coda decay characteristics is shown in Figure 3. Amplitude measurements, scaled relative to the largest excursion in the P or PKP coda, are made in a specified set of successive time windows. Measurements are made until the coda decays into the pre-existing ambient noise level, or until a period of 15 minutes has elapsed from the time of coda onset. In a few cases, measurements terminated with the arrival of a second event.

The principal coda maxima are next plotted on log-linear paper, and the coda envelope obtained by connecting successive determinations. For example, the coda measurements of Figure 3 yield the coda envelope shown in Figure 4a. If the coda measurements for a set of events from a given region are plotted for a station, a graph similar to that in Figure 4b may be obtained. The coda characteristic for events from a given region as recorded at a particular station may then be defined in several ways. One might construct an envelope which allows 5% (or one) of the coda determinations to fall below the curve specified. Alternatively, as is done in this report, the average coda can be determined and a statistic associated with the spread in data.

RESULTS

Coda decay characteristics for events in the 15 regions studied are given in Figures 6 through 272 (see List of Figures for a breakdown of figure numbers by region and station). The individual coda are shown by dotted lines, while the solid line shows the average coda decay curve. The table accompanying each graph lists the average coda values and their corresponding standard deviations (in units of m_b) as a function of elapsed time. In determining the average coda decay curve, coda observations for a given event were terminated at the minimum coda value observed for that event.

Whether the P or PKP coda is given for a station depends on the station's distance from the events analyzed. In some cases a station will see P for events in one portion of a region, while PKP will arrive first from events in another portion. Where this occurs, two graphs of coda characteristics are given. One observation to be drawn from these data is that coda characteristics are not strongly influenced by epicentral region, they are controlled primarily by the arrival times of significant secondary phases. To illustrate this, we cite below several types of coda characteristics, grouped by epicentral distance:

- I $20^\circ - 45^\circ$
- II $45^\circ - 80^\circ$
- III $80^\circ - 105^\circ$

In the first distance range, 20° to 45° , reference to the travel-time curves for P phases (Figure 5) shows

that the secondary phase PP should arrive up to 2 minutes after the P phase. Further, one might expect a third arrival, PcP 4 to 2 minutes into the P coda. Between 35° and 45°, ScP is observed 5 to 6 minutes after the arrival of P. Though not shown in Figure 5, between 6 and 20 minutes into the P coda, surface-wave arrivals should be observed. This characterization is seen, for example, in the coda determined for California-Western United States events recorded at CMC (Figure 48, 25-42°), for Solomon Islands-New Hebrides events recorded at ADE (Figure 149, 30-34°) and for Iran-Turkey events recorded at NDI (Figure 235, 19-35°). These data, together with other well-determined coda characteristics for events recorded at epicentral distances between 20° to 45° (Table XIX) yield the results shown in Figure 274. The average coda decay curve has a representative standard deviation of about $\pm .25 m_b$ units.

One caution should be noted in using the coda determined for the range 20° to 45°. While high coda levels are observed in the P coda due to the arrival of surface waves, these arrivals have periods on the order of 1 to 3 seconds, and sometimes greater. As such, despite the high amplitude of the surface wave arrival, the arrival from an explosion, due to its shorter period, may be distinguishable in the surface-wave background. Use of coda where large-amplitude surface-wave arrivals are present therefore, will lead one to overestimate the number of masking opportunities. We suggest that in computing masking opportunities, large-amplitude surface-wave arrivals should be omitted, and the coda allowed to

decay at rates determined elsewhere in this report.

In the distance interval 45° to 80° , PcP is the first secondary arrival which is both predictable and significant. This phase arrives between 2 and 0 minutes after the P arrival in the distance range considered, and precedes the arrival of the somewhat less significant PP phase by 0 to 3 minutes. Representative coda for epicentral distances of from 45° to 80° include the coda for Kamchatka-Kurile Island events recorded at BOZ ($54-63^\circ$) for Japan events recorded at NDI ($51-61^\circ$), and for Philippine Island events recorded at SHI ($60-78^\circ$). These coda sets, together with those listed in Table XX were used to produce the 45° -to- 80° coda representation shown in Figure 275. The average curve determined from the composite data set has a standard deviation of about $\pm .25 m_b$ units. For elapsed times between 4 and 10 minutes, the coda decay constant λ is .0017 per second ($e^{-\lambda t}$; t in seconds).

With respect to the distance interval 80° to 105° , we find, first, that between 80° and 90° , P and PcP arrive almost simultaneously; the largest coda amplitude, therefore, is generally found in the first 30 seconds of the short-period record. An example of coda in this range is the data for Kamchatka-Kurile Island events recorded at WES (Figure 112). Beyond 90° , P becomes weaker, and both P and PP, the latter delayed 3 to 4 minutes relative to P, control the coda characteristics (see, for example, the data for South American events recorded at CMC (Figure 11)). Using the data given in Table XXI, we obtain the average 80° to 105° coda representation shown

in Figure 276. The nominal standard deviation is $\pm .25 m_b$ units. At elapsed times between 4 and 9 minutes, the average coda decay constant is .0037 per second.

Beyond 105° a great variation in coda characteristics as a function of distance is observed. For example, between 105° and 110° , the first arrival, which may or may not be observed due to its low amplitude, is diffracted P. This arrival is followed about 4.5 minutes later by PP, which is the largest-amplitude phase in the P coda in this distance interval. The coda decay curve shown in Figure 6, obtained from a South American event recorded at ADE ($\Delta \sim 107^\circ$), exhibits these characteristics.

In the distance interval 110° to 120° , it may be possible to observe weak diffracted P signals as the first arrival. The arrival of this phase, if it is observed, will be followed about 4 minutes later by the arrival of PKIKP, the largest-amplitude phase in the short-period seismogram. Approximately 1 minute after the arrival of PKIKP, PP will arrive, followed approximately 3 minutes later by the arrival of SKP (PKIKP-SKP ~ 4 minutes). The coda characteristics observed at DAL for a large ($m_b = 6.6$) Tadjik event (Figure 244) display these features.

Between 120° and 140° , the first arrival, PKIKP, is the largest amplitude phase on the short-period vertical record. Following this arrival by approximately 3.5 minutes is the phase SKP. SKP is also of large amplitude, and is more readily observable than PP, which can arrive up to 2 minutes earlier than SKP in

this distance interval. Examples of these characteristics are seen in the coda determined for Central American events recorded at NDI (Figure 40).

In the distance interval 140° to 150° , PKP_1 and PKP_2 arrive almost simultaneously, producing a large-amplitude first arrival. Approximately 3 minutes into the PKP coda, PP arrives, followed shortly thereafter (~ 0.5 minutes) by the arrival of SKP. Several of the PKP coda observed for Central American events recorded at CHG exhibit these characteristics (Figure 29). Though not apparent in Figure 29 (due to the manner in which the coda are quantified), PP is dominant over SKP in this distance interval.

Beyond 150° , the first arrival is PKP_1 , followed up to 2 minutes later by the arrival of PKP_2 . Of the two, PKP_2 is stronger. PKP_2 , in turn, is followed approximately 3.5 minutes later by the arrival of PP. The coda for South American events recorded at CHG (Figure 10) exhibit these characteristics.

A second finding of this study is that coda determined from large events ($6.0 \leq m_b \leq 7.0$) appear applicable to smaller events as well. To see this, we show in Figures 277 through 279 some earlier coda determinations for Kamchatka-Kurile Islands events recorded at NP-NT, RK-ON, and WMO. These coda were determined for events in the magnitude range $5.0 \leq m_b \leq 5.8$. Compare the NP-NT coda with the coda obtained at MUN ($6.0 \leq m_b \leq 6.7$; Figure 162) for Solomon Islands-New Hebrides events. Both sets of determinations have their peak values in the first 30 seconds of the seismogram, thereafter

falling to a relative minima (10% to 40%) at an elapsed time of about one minute. A relative maxima (20% to 50%) is observed for both data sets between 1.5 and 2.5 minutes, most probably related to the arrival of PcP. Following this relative maxima, the coda decay to values on the order of 5% to 20% at an elapsed time of 5 minutes. For comparison, the average coda decay curve determined for the MUN data is superimposed on the NP-NT data. Given the spread in observations observed for the MUN coda ($\sim .3 m_b$ units), we can not reject the hypothesis that the average coda decay curve determined from the MUN coda is representative of the average decay characteristics for the NP-NT data.

Similar observations can be made using the Kamchatka-Kurile Islands coda decay curves determined at RK-ON (Figure 278) and the Alaskan data obtained for KON ($5.7 < m_b < 6.8$; Figure 71) and using Kamchatka-Kurile Islands data from WMO (Figure 279) and IST ($5.8 < m_b < 7.0$; Figure 103). These comparisons suggest that the average coda decay curves presented in this report should be applicable over a magnitude range of at least $5.0 \lesssim m_b \lesssim 7.0$.

CONCLUSIONS

From an examination of P and PKP coda for earthquakes from 15 seismic regions as recorded at 17 World Wide Standard Seismograph Stations, we conclude:

1. Coda for events in a given region recorded at a given distance are found to be very similar to the coda for events from another region recorded at the same distance. That is, coda characteristics are determined primarily by the arrival times and amplitudes of significant secondary phases.

2. Coda characteristics determined for large events ($6.0 \leq m_b \leq 7.0$) appear applicable to smaller events ($5.0 \leq m_b \leq 6.0$) as well. The average coda determinations presented in this report, therefore, are representative of coda for events in the range $5.0 \leq m_b \leq 7.0$.

3. Using data in the range $45^\circ < \Delta < 80^\circ$, the long-term P-coda decay constant λ for elapsed times greater than 4 minutes is .0017 per second ($e^{-\lambda t}$). In the range $80^\circ < \Delta < 105^\circ$, the decay constant is somewhat larger, being on the order of .0037 per second.

REFERENCE

Herrin, E. (Editor), 1968, 1968 Seismological tables for
P phases: Bull. Seis. Soc. Am., v. 58, No. 4, August.

TABLE I
Earthquake Epicentral Regions

<u>REGION</u>	<u>LOCATION</u>	<u>LATITUDE (RANGE DEGREES)</u>	<u>LONGITUDE (RANGE DEGREES)</u>
I	South America	10N-40S	65W- 81W
II	Central America	5N-20N	81W-109W
III	California and Western United States	20N-45N	109W-131W
IV	Alaska	55N-65N	143W-160W
V	Aleutian Is.	50N-55N	160W-170E
VI	Kamchatka-Kurile Is.	42N-57N	145E-167E
VII	Japan	9N-45N	136E-145E
VIII	Philippine Is.-Taiwan	10S-33N	120E-132E
IX	Solomon Is.-New Hebrides	1S-23S	136E-175E
X	Sumatra-Java	15S-20N	90E-120E
XI	Tonga Is.-Fiji Is.	15S-38S	171 -175W
XII	Turkey-Greece	33N-47N	8E- 36E
XIII	Iran-Turkey	25N-45N	36E- 66E
XIV	Tadzhik-Hindu Kush	27N-42N	66E- 80E
XV	China-Nepal-Burma	20N-50N	80E-110E

TABLE II
Station Information-Worldwide Network

STATION	LOCATION	LATITUDE (Deg Min Sec)	LONGITUDE (Deg Min Sec)	ELEVATION Meters	DATES OF OPERATION
ADE	Adelaide, Australia	34 58 01.0S	138 42 32.0E	655	01 Apr 62 31 Dec 68
AQU	Aquila, Italy	42 21 14.0N	13 24 11.0E	720	02 Apr 62 30 Nov 67
BOZ	Bozeman, Montana	45 36 00.0N	111 38 00.0W	1575	29 Aug 63 01 Mar 68
CHG	Chiengmai, Thailand	18 47 24.0N	98 58 37.0E	416	02 Mar 63 08 Jun 69
CMC	Copper Mine, Canada	67 50 00.0N	115 05 00.0W	31	07 Apr 63 31 Mar 69
DAL	Dallas, Texas	32 50 46.0N	96 47 02.0W	187	12 Sep 61 30 May 67
DAV	Daewo, Philippine Is.	7 05 1.0N	125 34 29.0E	85	01 Sep 64 31 May 69
IST	Istanbul, Turkey	41 02 36.0N	28 59 06.0E	65	10 Jan 62 20 May 69
KBL	Kabul, Afghanistan	34 32 27.0N	69 02 35.4E	1920	08 Jun 68 31 Apr 69
KON	Kongsberg, Norway	59 38 57.0N	9 37 55.0E	200	26 May 62 24 May 69
MAL	Malaga, Spain	36 43 39.0N	4 24 40.0W	60	07 Mar 62 01 Jun 69
MAT	Matsushiro, Japan	36 32 30.0N	138 12 32.0E	440	01 Aug 65 30 Jun 68
MUN	Mundaring, Australia	31 53 30.0S	116 12 24.0E	235	30 May 62 31 Mar 68
NDI	New Delhi, India	28 41 00.0N	77 13 00.0E	230	04 Apr 63 31 Oct 67
SEO	Seoul, Korea	37 34 00.0N	126 58 00.0E	86	07 Mar 63 05 Mar 69
SHI	Shiraz, Iran	29 48 39.0N	52 51 34.0E	1595	04 May 63 30 Apr 69
MES	Weston, Massachusetts	42 23 04.9N	71 19 19.5W	60	08 Oct 61 30 Nov 68

TABLE III
Events Analyzed
AREA I
SOUTH AMERICA

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
25 Jul 64	19 31 07.0	27.93	70.8W	26	6.1			82°		101°	65°											
18 Aug 64	04 44 58.0	26.85	71.5W	8	6.4		104°	80°		99°	64°					90°			152°	162°	131°	70°
28 Mar 65	16 33 14.6	32.45	71.2W	61	6.4	107°	107°			105°					113°	89°				164°	131°	68°
11 Sep 65	22 15 14.8	7.8W	71.8W	14	6.0			51°														74°
03 Nov 65	01 39 02.5	9.15	71.4W	583	6.2	128°			167°													
27 Jul 66	04 48 59.4	24.25	70.2W	35	6.0							163°			93°			139°				51°
10 Nov 66	03 02 32.5	31.85	68.4W	113	6.0			87°	163°	105°	62°	157°				87°		124°	151°	160°	129°	66°
09 Feb 67	15 24 47.2	2.8W	74.9W	58	6.3	131°		58°	163°		70°					91°	158°	116°	150°			74°
15 Feb 67	16 11 11.8	8.05	71.3W	597	6.2	128°						159°	102°		90°	76°	135°	143°	140°	124°		
11 May 67	15 05 16.8	20.35	68.5W	67	6.1			76°				161°			93°		142°	139°				
29 Jul 67	10 24 24.6	4.8W	73.0W	161	6.0	129°	92°															51°
03 Sep 67	21 07 30.8	18.45	79.8W	38	6.5	122°	99°				45°	161°	103°		92°	77°	139°	140°	144°	124°		
04 Nov 67	16 26 48.2	2.8E	77.7W	99	6.0	129°	93°		172°		46°	155°	111°		99°			135°	152°	124°		49°
15 Nov 67	21 31 51.5	28.72	71.2W	15	6.2		105°	57°	164°			156°						143°	145°	139°	132°	53°
21 Dec 67	02 25 21.6	21.85	70°W	33	6.3	117°		83°	167°	102°		153°	115°		103°	78°	133°	145°	152°	132°		45°
27 Dec 67	09 17 55.7	21.23	68.3W	135	5.4	119°			169°	95°		159°	111°			90°		152°				
30 Jul 68	20 38 42.0	9.93	80.5W	37	5.8				168°	95°		161°						126°				64°
22 Sep 68	21 52 59.2	24.15	66.5W	194	5.5												152°	127°				
28 Sep 68	13 53 35.3	13.25	76.4W	70	6.0																	
17 Nov 68	00 16 08.6	8.5W	72.8W	172	5.7																	
04 Feb 69	04 10 13.3	8.2E	80.2W	16	6.0																	
Total Events by Station:																						
						9	6	8	8	7	6	11	6	5	7	8	6	10	8	7	11	11

TABLE IV
Events Analyzed
AREA I.
CENTRAL AMERICA

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M _b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	STATION KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
06 Jul 64	07 22 11.7	18.3N	100.4W	100	6.3	125°							105°									
21 Mar 65	09 42 41.3	11.7N	86.4W	36	5.2						23°								144°	133°		34°
23 Aug 65	19 46 02.9	16.3N	85.8W	28	6.7	128°						133°			84°							
24 Aug 65	00 56 21.4	15.9N	86.2W	12	5.5				142°													
18 Oct 65	22 50 41.9	15.7N	95.4W	36	5.3						17°						107°	147°	135°		125°	33°
09 Dec 65	06 07 48.6	17.3N	120.8W	57	6.0	125°																
15 Dec 65	23 05 20.7	7.5N	81.2W	15	6.0			30°	140°	64°			105°			84°	103°	144°				
09 Apr 66	02 34 23.0	9.4N	84.2W	40	5.3			46°	154°			149°				76°		150°	139°		123°	36°
09 Apr 66	02 42 08.7	9.6N	84.1W	30	5.7						26°											
11 Apr 66	17 17 33.8	18.4N	102.2W	72	5.7			43°	152°	62°	26°	145°			84°	76°			138°		35°	
25 Sep 66	06 02 26.4	18.3N	100.8W	60	6.1	125°		28°	138°	50°	15°				85°				133°		126°	36°
03 Oct 67	18 16 03.2	10.9N	85.9W	21	5.8			29°	138°						84°	84°		144°	133°			
15 Oct 67	08 00 50.3	11.9N	84.0W	162	6.2	133°		90°		60°		144°						151°	137°		123°	34°
02 Jul 68	03 44 48.9	17.6N	100.3W	41	5.9			40°				143°	100°				116°	151°	137°	122°	123°	33°
25 Aug 68	14 06 43.9	16.6N	97.7W	40	6.3	127°								127°								
02 Sep 68	10 38 38.4	15.6N	92.6W	138	5.7				141°									146°	135°		126°	
16 Dec 68	03 07 24.1	7.1N	81.2W	16	5.3									127°								
10 Mar 69	08 15 08.4	12.3N	87.3W	62	5.3									130°								
14 Mar 69	08 47 16.3	12.9N	86.8W	178	5.6									128°								

Total Events by Station:

7	2	7	8	4	6	5	3	5	4	4	3	8	9	1	6	8
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TABLE V
Events Analyzed
AREA III
CALIFORNIA AND WESTERN UNITED STATES

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
05 Jul 64	19 07 57.8	26.2N	110.2W	29	6.0					42°									125°			
22 Dec 64	20 54 35.3	31.9N	117.1W	14	6.3	120°		14°	119°	36°			88°		79°							38°
29 Apr 65	15 28 43.3	47.4N	122.4W	57	6.5													153°	102°	75°	103°	
16 Sep 65	04 10 22.6	40.4N	125.7W	33	5.6						24°											
09 Mar 66	14 02 12.8	27.6N	115.0W	33	5.4			18°		40°												
10 Apr 66	22 27 01.8	41.4N	125.5W	33	5.6			11°		27°	24°											
21 Jun 66	09 46 20.1	34.5N	120.7W	5	5.6			13°														
07 Aug 66	17 36 26.7	31.8N	114.5W	33	6.3				120°													
16 Aug 66	18 02 36.1	37.4N	114.2W	33	6.1				116°	30°							86°	83°		90°		36°
10 Dec 67	12 06 50.3	40.5N	124.6W	5	5.8					28°	24°						82°			86°		33°
28 Dec 67	06 26 15.8	44.2N	128.8W	33	5.4					25°	27°						73°	67°				
09 Apr 68	02 28 58.9	33.1N	116.1W	20	6.1		89°	11°									85°					41°
08 May 68	12 17 13.4	43.6N	127.9W	33	6.1			12°							71°	85°	82°			88°		
25 Nov 68	00 53 01.3	20.3N	109.3W	33	5.0								99°									
04 Apr 69	16 16 17.2	24.4N	109.8W	31	5.6								93°									
28 Apr 69	23 20 42.9	33.3N	116.3W	20	5.7																	
Total Events by Station:																						
						1	1	6	3	7	4	0	3	3	3	5	3	1	2	5	1	4

TABLE VI
Events Analyzed
AREA IV
ALASKA

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	MES
06 Feb 64	13 07 25.2	55.7N	155.8W	33	6.8						46°		84°		61°	83°			85°		91°	54°
28 May 64	16 18 04.2	54.3N	156.6W	25	5.4			27°														
05 Jul 64	03 14 33.3	60.8N	144.9W	30	5.0			25°														
06 Feb 65	16 50 29.0	53.3N	161.8W	33	6.1							74°								50°		
16 Apr 65	23 22 18.6	64.7N	160.1W	5	5.8															49°		
23 Jun 65	12 02 46.2	56.7N	151.8W	29	4.8					20°												
23 Jun 65	12 23 22.2	56.6N	152.8W	25	6.0					20°												
23 Jun 65	14 22 45.2	56.6N	152.3W	33	5.0					20°												
11 Aug 65	18 29 40.1	59.6N	147.8W	25	5.5																	
04 Sep 65	14 32 47.9	58.2N	151.8W	19	6.1																	
08 Sep 65	03 26 20.7	57.5N	152.1W	25	5.5				84°			80°	81°		62°	82°	52°	117°	84°		90°	51°
22 Dec 65	19 41 23.0	58.4N	153.0W	50	6.5				83°			80°	81°		62°		49°	117°	84°		90°	
22 Jan 66	14 27 07.9	56.8N	153.7W	33	5.8				84°			79°	83°		63°				85°	54°	91°	52°
08 Apr 66	09 19 09.6	54.9N	151.0W	33	4.7					20°												
09 Apr 66	18 51 45.0	60.2N	147.1W	34	4.7																	
09 Apr 66	20 08 39.0	56.7N	152.0W	33	5.5																	
11 Apr 66	18 26 11.8	57.2N	152.1W	33	5.5																	
11 Apr 66	23 00 24.0	56.8N	152.1W	33	4.9																	
16 Apr 66	01 27 15.3	57.0N	152.0W	33	5.4																	
22 Apr 66	10 15 51.0	56.9N	153.0W	33	5.7				84°		45°		82°		63°						91°	52°
22 Apr 66	23 27 20.5	57.5N	152.1W	22	4.9																	
22 Jun 66	11 38 53.7	61.4N	147.6W	53	5.2						45°	80°				82°			85°		91°	51°
07 Aug 66	14 11 51.2	59.6N	148.4W	4	5.5																	
15 Aug 66	10 58 51.7	58.2N	153.1W	41	4.9																	
15 Aug 66	13 36 23.7	60.4N	146.0W	9	5.3																	
30 Aug 66	20 20 54.0	61.3N	147.5W	36	5.9				85°													
07 Oct 66	20 55 56.0	61.8N	150.1W	56	5.7				84°													
07 Feb 67	14 53 13.9	56.7N	157.2W	67	5.6				83°				77°		58°	78°	50°		83°	56°	88°	48°
10 Apr 67	19 57 34.4	58.8N	154.3W	86	5.5																	
21 Jun 67	18 04 49.5	64.8N	147.4W	17	5.4																	
01 Jul 67	23 10 07.2	54.4N	147.1W	33	6.2																	
28 Sep 67	15 44 55.7	59.5N	147.1W	28	5.6																	
23 Apr 68	20 29 14.5	58.7N	150.0W	23	6.3																	
29 Oct 68	22 16 15.6	65.4N	150.1W	7	6.0				85°			81°	80°			81°	52°	119°	85°	55°		
11 Nov 68	08 53 52.0	57.3N	150.4W	59	5.3																	
15 Nov 68	00 07 09.7	58.1N	150.4W	26	5.1																	
27 Nov 68	12 55 56.1	56.8N	157.8W	61	5.3																	
Total Events by Station:																						
		0	1	13	8	10	3	6	8	4	8	5	8	3	8	6	8	7				

TABLE VII
Events Analyzed
AREA V
ALEUTIAN ISLANDS

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (M)	W	AGE	ASU	ROI	CHG	CNC	DAL	DAY	STATION IST KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	NES
04 Feb 65	05 01 21.8	51.3N	178.6E	40	7.5	93°	85°	48°	44°	37°	85°	62°		69°			99°	72°	35°	82°	71°
07 Feb 65	02 17 00.2	51.4N	173.4E	40	6.0	91°	83°	48°									99°	70°	38°		
17 Mar 65	14 27 12.4	52.8N	171.9E	23	6.0	92°	84°						85°		93°						
30 Mar 65	02 27 07.7	50.6N	177.9E	51	6.5	92°	84°						83°	68°				72°	37°	84°	70°
23 May 65	23 46 12.0	52.2N	175.0E	22	6.1	92°	85°	40°					85°	69°							69°
30 Jun 65	08 33 31.8	51.7N	176.5E	60	6.0																
02 Jul 65	20 58 40.0	53.1N	167.7W	59	6.6				67°							30°					
02 Sep 65	04 26 37.3	51.9N	175.5E	31	5.6											30°					
27 Sep 65	05 09 13.1	51.9N	175.5E	41	5.5	92°										30°	98°	75°	38°	87°	70°
01 Oct 65	08 52 05.8	50.1N	178.3E	32	6.3											42°					
19 Oct 65	20 48 47.4	52.3N	174.3E	48	5.6				84°	38°											
23 Oct 65	06 00 48.5	53.8N	165.5W	16	5.5				78°												
22 Nov 65	14 00 27.0	52.0N	176.1W	49	5.5				72°												
23 Nov 65	02 17 49.4	51.4N	179.7W	48	5.6				70°												
04 Dec 65	02 11 49.9	51.3N	170.6W	18	5.5																
16 Jan 66	09 11 50.0	52.9N	171.9E	25	5.7																
15 May 66	14 46 06.5	51.5N	178.4W	31	5.8				71°	36°											
02 Jun 66	03 27 53.3	51.1N	176.0E	41	6.0	92°															
04 Jun 66	18 33 35.7	51.7N	179.9E	13	6.2	94°							84°					73°	37°	85°	68°
11 Aug 66	10 45 59.6	52.8N	169.7W	61	6.5								63°						39°	86°	62°
29 Apr 67	03 55 20.8	51.4N	178.3W	50	6.0													80°	46°	90°	62°
03 Oct 68	11 08 38.9	51.6N	174.1W	46	5.0													76°			
07 Nov 68	00 48 33.6	54.3N	164.6W	37	5.1																
07 Dec 68	15 40 57.9	51.6N	175.7E	33	5.3																
07 Dec 68	15 46 45.2	51.6N	175.8E	33	5.0																
01 Jan 69	09 07 04.3	51.2N	179.4W	34	5.4																
14 May 69	19 32 54.2	51.3N	179.9W	21	6.2																
Total Events by Station:																					
						7	4	5	8	5	5	5	7	5	7	3	7	7	7	8	6

TABLE VIII
Events Analyzed
AREA VI
Kamchatka-Kurile Islands

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M_b	ADE	AQU	R02	CHG	CMC	DAL	DAV	IST	KBL	STATION	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
01 Jan 64	17 26 43.5	45.4N	151.9E	45	6.1	81°	85°						80°	71°		71°	96°		80°	60°		75°	84°
31 May 64	00 40 36.4	43.5N	146.8E	48	6.3								79°	79°								84°	
23 Jun 64	01 26 37.0	43.3N	146.1E	77	7.0	78°							79°	79°								88°	
30 Jun 64	15 48 43.0	45.9N	150.4E	33	6.0								79°	79°		70°						88°	
28 Mar 65	13 22 57.6	55.1N	162.1E	33	5.9		78°															85°	
11 Jun 65	03 33 44.9	44.7N	148.7E	47	6.0	80°																	
18 Nov 65	21 58 12.4	53.9N	160.7E	12	6.0	91°		54°		40°		43°	79°			71°	95°		82°				86°
13 Jan 66	12 24 44.3	51.4N	156.9E	110	4.6							55°	77°				39°			64°	28°	76°	
16 Jan 66	19 44 39.5	54.9N	165.8E	15	5.6				61°								20°						
22 Jan 66	18 31 01.0	51.4N	156.9E	131	4.7												20°					78°	
28 Jan 66	22 38 12.2	51.0N	157.0E	107	5.6																	76°	
29 Jan 66	07 52 08.8	45.8N	151.5E	33	5.1			51°															
01 Feb 66	15 59 41.9	45.4N	150.0E	24	4.7																		
05 Feb 66	14 24 45.0	52.8N	158.8E	44	5.2																		
10 Feb 66	16 16 01.0	50.2N	155.1E	98	5.8			59°			76°		78°			67°	92°			61°	24°		79°
05 Mar 66	20 13 33.0	47.2N	150.8E	162	5.3				51°														
19 Mar 66	03 25 28.0	48.3N	154.3E	45	5.9	84°		60°		47°			79°			69°				61°	23°	75°	
04 Apr 66	01 46 44.9	43.3N	145.8E	11	5.6				46°														
11 May 66	14 17 34.1	51.2N	157.7E	47	5.9	87°		57°		43°	74°		78°			67°					26°	76°	78°
04 Jun 66	23 48 17.8	46.5N	156.2E	13	5.8	82°						45°	79°										
21 Jun 66	23 06 25.9	50.1N	157.8E	14	5.8																		
07 Dec 66	17 17 42.0	44.3N	151.7E	26	5.8																		
01 Apr 67	12 23 35.5	45.7N	151.8E	40	5.9			63°		50°	80°							13°			20°	76°	83°
01 Dec 67	13 57 02.4	49.5N	154.4E	136	5.9		82°	59°			77°	49°					92°						85°
28 Jul 68	21 12 38.1	55.4N	166.6E	33	5.4														88°				84°
28 Jul 68	21 23 06.7	55.3N	166.8E	22	5.1																		
14 Aug 68	01 13 45.2	55.6N	162.1E	71	5.3																		
18 Aug 68	11 54 59.4	48.2N	157.3E	27	5.2																		
30 Aug 68	05 24 41.6	51.3N	157.7E	21	5.1																		
08 Sep 68	20 09 51.2	46.0N	151.4E	31	5.0																		
07 Nov 68	14 36 38.8	45.0N	150.0E	59	5.0																		
19 Dec 68	15 15 55.7	53.3N	160.1E	33	5.4																		
10 Feb 69	21 47 55.9	44.2N	148.5E	33	5.1																		

Total Events by Station:

7 3 6 4 6 4 4 4 10 9 10 5 5 3 7 5 7 11

TABLE IX
Events Analyzed
AREA V-2
JAPAN

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M ₀	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MOON	NDI	SEO	SHI	NES
15 Jan 64	21 36	29.1N	140.8E	70	6.7	64°	94°				98°				83°	96°		65°	55°		75°	NES
07 May 64	07 58	40.4N	139.8E	33	6.2	75°					91°							75°	51°			93°
16 Jun 64	04 01	38.3N	139.1E	57	6.0	73°							79°					73°	51°			95°
12 Jul 64	01 45	38.8N	139.2E	13	6.0	73°												73°	52°	13°		95°
29 Mar 65	01 45	38.8N	142.8E	33	6.1	75°	85°	71°	57°	88°			79°		73°		5°	70°				92°
14 Aug 65	10 47	40.8N	142.2E	93	4.7																	
25 Oct 65	11 39	40.8N	142.2E	93	4.7																	
12 Nov 65	22 34	44.2N	143.3E	180	6.2	79°						41°	78°		70°	95°		80°	54°	13°	73°	88°
02 Jan 66	17 52	50.2N	148.2E	40	6.6	65°		80°	37°	67°		27°	85°		81°					11°		
08 Jan 66	04 04	51.3N	148.2E	394	5.2									60°								
08 Jan 66	22 22	51.7N	147.7E	423	4.7																	
21 Jan 66	22 39	51.7N	148.3E	10	5.6			76°	62°								9°					
27 Jan 66	09 43	43.2N	143.6E	37	4.7				41°													
09 Feb 66	12 00	40.2N	140.5E	65	5.1				45°								6°					
18 Feb 66	19 02	51.5N	143.9E	357	5.0																	
20 Feb 66	00 12	44.5N	143.1E	225	5.2																	
28 Feb 66	02 02	43.7N	139.4E	71	4.3								75°									
10 Mar 66	04 26	32.2N	137.5E	225	5.5			71°	56°				82°				6°					
29 Mar 66	02 17	33.5N	142.1E	382	5.6				73°													
05 Apr 66	08 51	37.0N	138.2E	79	5.9	58°												61°	58°	19°	78°	
16 Apr 66	08 13	35.0N	141.5E	4	5.2				39°													
21 Apr 66	15 45	36.1N	141.8E	63	5.3				41°													
07 Jun 66	15 59	36.0N	139.6E	50	6.5	46°			41°			14°	98°		99°			49°		29°		
23 Jun 66	05 01	43.5N	139.9E	218	5.5				42°	56°			75°									
20 Aug 66	09 32	43.1N	140.4E	161	5.8			71°														
12 Nov 66	12 49	41.8N	142.1E	33	5.8			70°	60°			34°	79°		72°	99°	22°	78°	55°		72°	90°
17 Jan 67	11 59	38.5N	142.1E	44	5.9	73°																
07 Feb 67	08 28	33.9N	144.8E	138	5.4																	
21 Jun 67	12 09	35.0N	135.6E	32	4.2																	
26 Aug 67	16 51	37.5N	144.0E	94	4.9																	
09 Apr 68	00 36	32.2N	140.7E	33	6.1	47°						16°										
12 Jun 68	21 17	32.4N	141.2E	63	4.1	74°						36°	80°									
15 Jun 68	13 41	39.1N	142.7E	44	6.0																	
02 Jul 68	19 53	41.8N	142.7E	33	5.2																	
12 Jul 68	22 12	39.0N	139.6E	33	5.1																	
20 Sep 68	00 44	39.5N	143.2E	28	6.0		87°															
29 Oct 68	22 25	36.8N	138.1E	59	5.0																	

Total Events by Station:

11 3 6 7 7 4 6 10 4 7 3 7 11 8 7 7 7

TABLE X
Events Analyzed
AREA VIII
PHILIPPINE ISLANDS-TAIWAN

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	Δ	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	STATION IST KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
18 Jan 64	12 04 40.0	23.1N	120.5E	33	6.1	60°	86°						76°	80°			55°	39°		60°	
28 Mar 64	23 28 27.9	1.6N	127.2E	103	6.3	38°											55°	39°		60°	
30 Jun 64	13 46 21.6	.8S	122.5E	36	6.3					99°							35°	55°		76°	
08 Jul 64	11 55 39.0	5.5S	129.8E	165	6.5												32°	52°	38°		137°
11 Oct 64	21 15 03.9	.6S	121.7E	33	6.3	38°											32°	52°	38°	72°	139°
01 Nov 64	12 26 06.2	3.1N	128.1E	65	6.3	39°			29°			9°	92°				32°	52°	38°	72°	
01 Aug 65	09 19 51.7	.3N	125.8E	91	5.4				32°			8°					37°	55°	34°	76°	
09 Aug 65	02 34 21.7	7.0S	123.1E	576	5.5				35°												
17 Aug 65	07 36 17.0	12.4N	125.7E	76	5.0																
18 Aug 65	11 13 17.4	7.0S	129.1E	135	5.1				39°						27°						
06 Sep 65	03 18 39.1	21.2N	121.4E	33	5.2				21°						21°						
14 Sep 65	08 27 15.9	8.4N	126.8E	33	5.7																
16 Sep 65	13 50 11.8	7.1N	126.5E	179	6.0				92°												
10 Oct 65	10 21 00.7	26.3N	124.1E	33	5.4				94°												
12 Oct 65	18 55 57.0	.2N	124.1E	159	5.6																
18 Oct 65	21 50 04.5	1.1S	127.9E	33	5.9						127°										135°
24 Oct 65	14 32 13.7	4.1N	125.9E	175	5.8																
16 Nov 65	17 05 37.9	25.4N	125.2E	77	6.0				77°												
20 Nov 65	15 05 39.0	7.3S	129.2E	132	6.1			92°													
21 Nov 65	10 31 49.7	6.1S	130.4E	93	6.3			115°													
15 Dec 65	08 22 21.9	.1N	123.7E	162	5.9			114°													139°
11 Jan 66	03 10 53.0	.7N	120.2E	33	6.0	39°			28°	102°		8°									
12 Mar 66	16 31 21.8	24.1N	122.6E	63	6.7							17°	77°							70°	
12 Mar 66	17 59 39.0	24.4N	122.8E	83	5.7							17°									
23 Mar 66	00 04 34.7	23.9N	122.8E	51	6.3																
23 Apr 66	00 09 34.4	.9S	122.4E	45	6.0	69°		95°		103°	131°		78°						39°	73°	137°
23 Apr 66	03 49 03.4	.6S	122.0E	15	5.3	37°						8°									
23 Apr 66	14 19 47.3	.3S	122.3E	108	5.1							8°									
22 Jun 66	20 29 03.6	7.2S	124.6E	507	6.1	44°															
27 Jun 66	22 44 22.1	7.3N	125.0E	39	6.3																
01 Jul 66	05 50 39.2	24.8N	122.5E	117	6.4				78°			18°	77°								
01 Jul 66	22 12 18.0	2.4N	127.3E	85	5.0							5°									
18 Aug 66	14 13 59.8	.2S	125.1E	56	6.3																
18 Aug 66	14 37 53.0	.1S	125.1E	33	6.3																
21 Aug 66	05 00 26.8	8.5N	126.7E	67	6.0	45°		105°	29°	101°			95°	96°			41°	51°			

TABLE X (Cont'd.)

DATE	ORIGIN TIME			LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	μ_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	STATION					MAT	MUN	NDI	SEO	SHI	WES
	Hr	Min	Sec												IST	KBL	KON	MAL							
08 Sep 66	21	15	52.8	2.4N	128.4E	96	6.9																		
28 Sep 68	09	54	45.9	15.9N	122.6E	27	5.2						125°		96°	51°	102°	121°							
05 Jan 69	07	28	55.8	4.1N	125.6E	59	5.3									60°									
19 Jan 69	17	19	23.1	1.7N	127.1E	86	5.1									63°									
21 Jan 69	01	47	29.6	7.3S	128.3E	91	5.6									70°									
20 Mar 69	23	38	40.6	8.8N	127.3E	33	5.1									59°									
Total Events by Station:								9	1	6	7	9	3	9	9	5	3	5	5	10	7	6	7	7	

TABLE XI
Events Analyzed
AREA IX
SOLOMON ISLANDS-NEW HEBRIDES

DATE	ORIGIN TIME			LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	STATION			MUN	NDI	SEO	SHI	WES
	Hr	Min	Sec												IST	KBL	KON					
01 Jan 64	20	02	32.5	3.2S	139.7E	33	6.3															
20 Jan 64	17	08	37.4	20.7S	169.9E	141	6.7	31°	151° 97°	46°				141°				49°	68°	42°	89°	
06 Jul 64	10	06	02.3	6.3S	154.7E	49	6.4	32°										44°	102°		123°	
09 Jul 64	16	39	49.3	15.5S	167.6E	121	6.6															
05 Sep 64	02	53	50.6	5.8S	154.0E	69	6.4		130° 97°				136°			133°		49°	98°		119°	123°
17 Nov 64	08	15	39.3	5.7S	150.7E	45	6.7		127° 99°	97°			31°			120°					103°	126°
04 Aug 65	08	47	12.4	13.2S	167.0E	237	5.7						112°		117°			41°	78°		100°	
13 Aug 65	04	40	55.3	15.9S	167.5E	34	5.7															
14 Aug 65	11	07	47.1	15.8S	166.8E	33	5.5											57°				
17 Aug 65	11	14	10.4	5.2S	152.6E	47	5.8											59°				
03 Sep 65	21	38	53.6	5.2S	153.7E	54	5.9											44°				
04 Feb 66	10	39	12.2	15.9S	167.9E	190	6.0					100°										
16 Feb 66	03	18	27.2	17.7S	167.9E	31	6.5		96°			101°		49°	138°	135°		49°	98°	66°	119°	
22 Feb 66	05	02	37.2	5.4S	151.5E	28	6.2	32°	99°			96°		29°	118°			42°			120°	124°
01 Apr 66	05	21	09.7	5.8S	149.1E	112	6.1	31°		55°								42°	79°		100°	177°
13 Jun 66	18	08	38.4	12.2S	167.1E	256	6.2	34°						46°	133°			40°		48°		
15 Jun 66	00	59	45.8	10.4S	160.8E	31	6.1					97°		39°	128°	126° 151°		51°	96°	62°	117°	121°
15 Jun 66	01	32	55.5	10.2S	161.1E	33	6.2							39°	128°	126° 151°				57°	125°	
29 Jun 66	21	46	54.5	13.8S	166.7E	35	6.2	33°		74°	98°								90°	57°		124°
04 Sep 66	09	41	23.8	2.5S	138.8E	39	6.0			45°												
07 Oct 66	15	55	10.8	21.6S	170.5E	161	6.4	31°						52°	142°	140° 164°		36°			88°	
01 Dec 66	04	56	58.2	14.0S	167.1E	132	6.1		94°			98°			135°	131° 156°		49°	103°		124°	125°
14 Dec 66	21	07	52.1	4.8S	143.9E	74	6.0	30°				99°				137°		50°	96°	45°	118°	123°
17 Jun 68	18	09	34.1	12.3S	166.7E	33	5.5															
26 Jun 68	15	40	31.1	22.2S	171.4E	90	5.6															
02 Jul 68	18	40	10.1	2.7S	138.9E	62	5.7															
20 Jan 69	12	24	35.2	10.3S	164.6E	4	5.6															
10 Mar 69	06	54	17.6	5.6S	147.2E	206	5.8															

Total Events by Station:

8	3	6	4	8	1	7	10	5	7	6	6	12	11	7	13	9
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TABLE XII
Events Analyzed
AREA X
SUMATRA-JAVA

[illegible]

TABLE XIII
Events Analyzed

AREA XI
TONGA ISLANDS-FIJI ISLANDS

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
05 Jan 65	18 05 58.6	20.38	174.18	33	6.0	44°	157°	87°	98°	91°								63°	115°	80°	137°	
08 Jan 65	20 24 56.0	23.85	173.32	33	6.4	33°																
22 Mar 65	02 44 47.5	15.35	173.48	51	5.9																	
20 Aug 65	21 21 50.9	22.95	176.38	77	6.2	41°	90°	92°	93°	94°	94°	64°	152°		143°	165°	73°	60°	114°	80°	136°	
01 Sep 65	04 47 34.9	18.65	176.62	107	6.2	33°	101°	93°							154°		81°	52°	115°	87°	135°	125°
19 Sep 65	01 26 52.5	22.15	174.99	33	5.4												73°					
17 Oct 65	03 55 15.4	15.75	173.88	51	5.5												69°					
12 Feb 66	11 39 25.5	18.35	174.88	190	5.6				96°													
17 Mar 66	15 50 32.2	21.15	179.78	626	6.2	39°			100°			61°	149°					58°	111°	77°	132°	117°
20 Mar 66	07 47 50.2	17.05	174.38	117	5.7				95°			66°										
01 Jun 66	11 47 33.1	23.85	174.98	24	5.5	42°	89°	94°	101°			66°			164°			61°	116°	82°		
10 Jul 66	01 22 02.9	17.45	178.78	532	5.8	42°																
10 Jul 66	10 00 39.1	30.15	177.88	40	5.8	37°	97°															
28 Aug 66	05 01 09.4	28.15	175.38	96	5.8	43°	92°						151°		140°	162°		56°	116°	85°	136°	
01 Jan 67	07 29 34.7	25.85	178.52	94	5.8	32°	103°	93°							155°	177°		62°	114°	79°	136°	
19 Jan 67	07 05 48.6	15.35	171.08	33	6.0	47°	152°	82°	93°	93°			148°		136°	157°	69°	51°	115°	87°	135°	127°
17 Feb 67	12 40 12.6	14.85	174.88	18	6.0		150°															
04 Mar 67	10 10 51.5	23.75	171.28	19	6.4	41°						65°	153°		144°		74°	60°	116°	82°	137°	
27 Dec 67	06 16 21.9	28.35	175.48	225	5.7				101°								70°					
11 Mar 68	16 22 48.5	22.35	174.88	33	6.1				97°				153°									
25 Jul 68	08 26 32.8	16.25	173.98	112	6.0								148°									
25 Aug 68	07 23 07.8	30.85	178.48	60	6.4								156°									122°
11 15 46.3		20.05	174.38	96	5.5																	
06 Oct 68	05 15 11.5	15.05	178.58	33	5.3																	
19 Oct 68	17 28 43.6	15.25	173.38	33	5.2																	
29 Oct 68	11 26 51.8	22.55	175.28	33	5.1																	
07 Nov 68	03 32 50.8	16.65	172.78	33	5.1																	

Total Events by Station:

12	3	8	6	10	2	5	5	7	9	9	10	8	4
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TABLE XIV
Events Analyzed
AREA XII
TURKEY-GREECE

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	m_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES
31 Jan 64	09 23 21.0	37.5N	23.2E	75	4.3																	
23 Feb 64	22 41 06.3	39.2N	23.7E	33	4.5								5°									
18 Mar 64	16 43 24.0	45.7N	14.1E	33	4.6		3°															
08 Apr 64	14 12 29.5	35.1N	24.3E	71	5.0								7°									
06 Oct 64	14 31 19.2	40.3N	28.2E	10	6.0			87°	64°													
27 Oct 64	19 46 12.0	47.8N	16.1E	39	5.6																	
31 Mar 65	09 47 30.7	38.6N	22.4E	78	6.3	130°												112°	46°	75°		
05 Apr 65	03 12 54.2	37.7N	21.9E	34	5.7					73°	89°								45°	78°	71°	
09 Apr 65	23 57 03.2	35.1N	24.3E	51	6.0	127°					93°									77°		
27 Apr 65	14 09 07.1	35.7N	23.5E	50	5.5																	
06 Jul 65	03 18 44.6	38.7N	22.6E	28	5.9																	
05 Feb 66	02 01 48.3	39.2N	22.0E	38	5.8			86°		69°	89°								46°	77°	67°	
09 May 66	00 42 55.6	34.5N	26.5E	33	5.5					74°			7°						43°	77°	73°	
20 Aug 66	12 05 19.0	42.3N	18.6E	22	5.5																	
29 Oct 66	02 39 29.4	39.2N	21.2E	20	5.7			82°	71°	68°	88°					19°						
09 Feb 67	14 08 18.7	40.8N	20.3E	3	5.6			86°	70°	67°					22°	20°			47°		28°	67°
01 May 67	07 09 00.5	39.7N	21.3E	15	5.6			85°		68°					20°	20°			47°		28°	66°
22 Jul 67	16 56 53.3	40.7N	30.8E	4	6.0	124°					92°	89°			28°	27°			40°	71°	21°	71°
30 Jul 67	01 31 01.7	40.7N	30.4E	16	5.6		13°			69°			6°		23°	27°			40°	71°	21°	71°
09 Nov 67	14 48 44.2	35.5N	27.8E	47	5.7					66°					19°	20°			47°		22°	
30 Nov 67	07 23 51.5	41.5N	20.5E	29	5.4																	
02 Dec 67	12 44 42.7	41.3N	20.3E	17	5.4																	
28 Mar 68	07 39 57.1	37.9N	20.9E	6	5.4															79°		
04 Jul 68	21 47 55.6	37.8N	23.2E	33	5.3																	
31 Oct 68	03 22 15.0	36.6N	27.1E	11	5.1																	
03 Nov 68	04 49 31.8	42.1N	19.4E	17	5.0																	
Total Events by Station:																						
					4	3	6	4	8	5	1	4	3	5	7	5	1	10	7	5	7	

TABLE XV
Events Analyzed
AREA XIII
IRAN-TURKEY

DATE	ORIGIN TIME			LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	M_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	STATION			MAL	MAT	MUN	NDI	SEO	SHI	NES															
	Hr	Min	Sec												IST	IBL	KON																						
12 Jan 64	12	45	51.1	31.5N	49.4E	67	5.2		31°		46°																												
19 Jan 64	09	13	53.5	26.9N	54.0E	33	5.6				42°																												
08 Feb 64	06	28	25.9	36.9N	50.3E	33	4.7										50°						7°																
16 Feb 64	00	17	15.1	30.1N	51.2E	37	5.3								21°																								
21 Feb 64	01	04	00.6	34.4N	58.1E	33	5.0										46°						7°																
19 Aug 64	09	33	10.0	28.2N	52.6E	50	5.6		35°		43°																												
19 Aug 64	15	20	13.9	28.2N	52.7E	50	5.6															62°																	
20 Aug 64	05	08	50.3	28.2N	52.6E	47	5.1		35°													62°																	
20 Aug 64	05	39	47.7	28.2N	52.6E	52	5.5		35°		43°											62°																	
04 Sep 64	03	39	36.7	39.8N	40.3E	33	5.0		20°																														
21 Jan 65	00	21	14.5	28.1N	56.0E	28	6.0																																
07 Mar 66	01	16	05.8	39.1N	41.7E	13	5.5		92°			72°		26°		45°	51°		83°	19°																			
20 Apr 66	16	42	03.7	41.7N	48.2E	19	5.5		91°			70°		10°		29°	41°					13°																	
12 Jul 66	18	53	08.5	44.6N	37.4E	26	5.9					66°		14°								59°	12°	80°															
19 Aug 66	12	22	09.6	39.2N	41.7E	26	6.1		92°							29°	36°		99°	31°	64°			73°															
18 Sep 66	20	43	53.3	27.8N	54.3E	16	6.2							81°										79°															
11 Jan 67	11	20	45.7	34.1N	45.7E	34	5.6		98°		54°	77°		70°	25°		35°	41°	84°	20°	64°			85°															
26 Jul 67	18	53	01.3	39.5N	40.4E	33	5.6	111°									28°																						
13 Jun 68	23	04	00.3	29.7N	51.5E	33	5.0												72°	32°																			
17 Jun 68	04	56	31.0	40.7N	48.0E	33	4.7									16°																							
17 Jun 68	04	59	04.7	40.9N	48.2E	33	5.0									18°																							
15 Jul 68	08	33	37.5	32.5N	48.7E	33	5.0									18°																							
29 Jul 68	16	03	42.1	36.5N	53.7E	14	4.6									17°																							
31 Aug 68	10	47	37.4	34.0N	59.0E	13	6.0	101°								13°																							
Total Events by Station:																							2	5	4	5	4	0	0	2	5	5	6	2	3	7	7	5	4

TABLE XVI
Events Analyzed
AREA XIV
TADZHIK-HINDU KUSH

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	ρ_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	MES
28 Jan 64	14 09 17.1	36.5N	70.9E	207	6.1	95°	44°	98°		110°						59°		80°				94°
02 Feb 65	15 56 51.0	37.5N	73.4E	33	5.8			97°														94°
14 Mar 65	15 53 06.6	36.3N	70.7E	219	6.6													80°		44°		
22 Jun 65	05 49 18.9	36.3N	77.7E	28	6.1		49°		76°		110°		33°		49°					39°		
05 Jan 66	20 45 54.6	36.2N	69.1E	33	4.9																16°	
24 Jan 66	07 23 07.6	29.9N	69.7E	12	5.8	92°			82°			57°		50°	50°	61°	76°			48°		
28 Jan 66	08 52 02.2	39.3N	73.1E	20	5.4				73°													
02 Feb 66	09 20 07.5	33.9N	73.0E	26	5.3																	
07 Feb 66	04 26 13.9	29.8N	69.7E	33	6.0	92°		105°				57°	35°		50°	61°	52°	76°				
12 Feb 66	08 04 58.0	39.1N	71.6E	70	4.7														11°			
12 Feb 66	16 34 11.3	36.6N	71.5E	188	4.9				30°													
16 Feb 66	09 44 22.0	29.9N	69.7E	34	4.6				29°													
17 Feb 66	18 26 17.7	29.9N	69.8E	22	4.4														2°			
28 Feb 66	20 03 06.0	32.8N	71.3E	153	4.4														6°			
02 Mar 66	04 02 46.5	36.1N	70.6E	162	4.5														8°			
04 Mar 66	06 01 05.0	30.0N	70.0E	33	4.4														6°			
15 Mar 66	09 14 29.3	29.9N	69.7E	36	4.4														2°			
04 Jun 66	05 11 54.2	36.2N	70.8E	207	5.7			98°													16°	
01 Aug 66	19 09 55.1	29.9N	68.8E	33	5.8			105°				58°	34°		45°	59°	57°			48°		99°
01 Aug 66	20 30 57.0	29.9N	68.6E	33	5.7										49°	60°						
10 Aug 66	21 02 59.6	30.0N	68.7E	33	6.2	92°						58°			49°	60°						
15 Aug 66	22 05 35.0	38.4N	69.6E	4	5.5			96°												41°	23°	
16 Aug 66	02 15 33.8	28.7N	78.9E	50	5.8	85°																
25 Jan 67	01 50 19.4	36.4N	70.8E	199	5.7			98°	30°				33°			59°						
20 Feb 67	15 18 39.9	33.7N	71.6E	281	5.7	95°	45°		26°	78°		57°	33°			59°	52°	80°		44°		94°
27 May 67	19 05 48.5	36.1N	75.3E	24	5.7							53°	37°		49°		51°	76°		42°	20°	
03 Apr 69	02 52 50.9	41.2N	79.2E	40	4.5			98°						10°								
17 Apr 69	03 21 16.4	30.1N	69.9E	7	4.5								4°									
Total Events by Station:																						
					6	3	8	4	4	2	2	6	7	2	7	8	5	6	7	8	5	4

TABLE XVII
Events Analyzed
AREA XV
CHINA-NEPAL-BURMA

DATE	ORIGIN TIME Hr Min Sec	LATITUDE (Degrees)	LONGITUDE (Degrees)	DEPTH (km)	m_b	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	STATION	KON	MAL	MAT	MUN	NDI	SEO	SHI	NES
27 Feb 64	15 10 48.4	21.7N	94.4E	102	6.4	70°					125°		58°			69°					32°	38°	115°
12 Jul 64	20 15 59.0	24.9N	95.3E	155	6.7															17°			
13 Jul 64	10 58 47.7	23.7N	94.7E	117	6.5	72°													59°				
12 Jan 65	13 32 24.0	27.6N	88.0E	23	6.1	79°	61°					41°	51°				76°		65°				
31 Jan 66	02 35 05.8	27.9N	99.6E	33	5.6								50°										
05 Feb 66	15 12 29.1	26.1N	103.1E	15	6.1							29°	62°				88°		59°	23°			
13 Feb 66	10 44 41.0	26.1N	103.2E	33	5.7	69°							62°					47°		23°			
06 Mar 66	02 10 56.8	31.6N	80.5E	35	5.4																		
09 Mar 66	02 15 56.7	31.6N	80.5E	35	6.1																		
31 Mar 66	15 06 28.0	34.8N	80.5E	33	5.4																		
10 Jun 66	23 38 00.5	36.4N	80.2E	33	4.5																		
27 Jun 66	22 41 48.5	45.1N	70.8E	203	5.6																		
27 Jun 66	10 49 50.0	29.7N	99.7E	37	5.1	84°						48°	43°										
27 Jun 66	10 59 18.1	29.8N	80.7E	33	5.8	85°																	
28 Sep 66	14 00 22.9	27.4N	81.0E	40	6.0	84°																	
16 Dec 66	20 52 13.5	29.6N	100.1E	33	6.2	72°						31°	59°										
15 Mar 67	06 58 04.6	28.4N	81.0E	9	5.9	84°																	
14 Mar 67	09 21 02.3	31.1N	93.7E	24	5.9	84°																	
30 Aug 67	04 22 01.5	31.7N	100.3E	33	5.7	78°																	
28 Jun 68	20 34 55.3	30.1N	95.1E	44	4.8							34°	57°										
05 Jul 68	14 32 14.1	40.2N	85.5E	33	4.6																		
04 Sep 68	01 40 04.0	33.5N	97.5E	33	4.8																		
05 Sep 68	08 57 45.3	46.7N	82.2E	33	4.7																		
Total Events by Station:																							
							12	3	4	4	8	1	5	9	4	6	5	3	6	5	3	8	1

TABLE XVIII
P and PKP Coda
Station and Region Totals

REGION	PHASE	ADE	AQU	BOZ	CHG	CMC	DAL	DAV	IST	KBL	KON	MAL	MAT	MUN	NDI	SEO	SHI	WES	REGION TOTALS
South America	P	1	6	8	8	7	6	2	2	6	8	6	10	8	8	7	11	11	P 55
Central America	PKP	8						11	4	5	1	1	2	10	8	7	11	8	PKP 79
California-Western United States	PKP	7		7	8	4	6	3	5	4	4	1	1	8	9	1	6	8	P 40
Alaska	P	1	6	6	3	7	4	3	3	3	5	3	3	1	1	5	1	4	PKP 50
Aleutian Is.	PKP	1		13	8	10	3	6	8	4	8	5	8	1	8	6	8	7	P 43
Kamchatka-Kurile Is.	PKP	7	4	5	8	5	5	5	7	5	7	3	7	3	7	7	8	6	PKP 9
Japan	PKP	7	3	6	4	6	4	4	10	9	10	5	5	3	7	5	7	11	PKP 3
Philippine Is.-Taiwan	P	11	3	6	7	7	4	6	10	4	7	3	7	11	8	7	7	7	PKP 99
Solomon Is.-New Hebrides	PKP	9	1	3	7	9	3	9	9	5	3	1	5	10	7	6	7		P 106
Sumatra-Java	PKP	8	3	6	4	8	1	7	10	5	7	6	6	12	11	7	6	7	PKP 115
Tonga Is.-Fiji Is.	P	7		9	3	1	6	8	3	2	1	6	5	5	8	9	9	5	P 94
Turkey-Greece	PKP	12	3	8	6	10	2	5	8	5	6	5	7	9	9	10	8	4	P 14
Iran-Turkey	P	4	3	6	4	8	5	1	4	3	5	7	5	10	7	7	5	7	PKP 80
Tadzhik-Hindu Kush	PKP	1	5	4	5	4	2	5	5	5	6	6	2	3	7	7	5	4	P 43
China-Nepal-Burma	P	6	3	8	4	4	1	6	7	2	7	8	5	6	7	8	5	4	P 71
	PKP	12	3	4	4	8	1	5	9	4	6	5	3	6	5	3	8	1	P 29
STATION TOTALS	P	81	35	90	64	98	43	65	85	49	74	61	71	68	86	87	76	69	P 69
	PKP	21	6	12	19	5	9	16	22	18	14	19	7	23	27	8	32	26	PKP 48
		102	41	102	83	103	52	81	107	67	88	80	78	91	113	95	108	95	P 80
																			PKP 5
																			P 71
																			P 91
																			PKP 1
																			P 85
																			PKP 2

Coda
1486
Analyzed

TABLE XVIX
Events Analyzed, Worldwide Distribution, 20° to 45°

<u>REGION</u>	<u>STATION</u>	<u>EVENTS DELETED</u>
Central America	BOZ	15 Dec 65
Central America	WES	
California	CMC	16 Aug 66
Alaska	BOZ	
Alaska	CMC	07 Aug 66, 15 Aug 66
Japan	DAV	07 Jun 66, 26 Aug 67
Solomon Is.-New Hebrides	ADE	
Sumatra-Java	DAV	24 Mar 67
Turkey-Greece	KON	30 Nov 67
Turkey-Greece	MAL	20 Aug 66
Turkey-Greece	SHI	
Iran-Turkey	KON	
Iran-Turkey	NDI	21 Jun 65
Tadzhik-Hindu Kush	IST	
China-Nepal-Burma	SHI	

TABLE XX
Events Analyzed, Worldwide Distribution, 45° to 80°

<u>REGION</u>	<u>STATION</u>	<u>EVENTS DELETED</u>
South America	BOZ	25 Jul 64, 10 Nov 66, 15 Nov 67
South America	DAL	
Kamchatka-Kurile Is.	NDI	
Japan	ADE	
Japan	CMC	
Japan	MUN	
Japan	SHI	26 Aug 67
Philippine Is.-Taiwan	SHI	
Solomon Is.-New Hebrides	SEO	01 Jan 64
Turkey-Greece	NDI	09 May 66, 22 Jul 67, 30 Jul 67
Iran-Turkey	CMC	
China-Nepal-Burma	KON	

TABLE XXI
Events Analyzed, Worldwide Distribution, 80° to 105°

<u>REGION</u>	<u>STATION</u>	<u>EVENTS DELETED</u>
South America	AQU	28 Mar 65
South America	CMC	
Alaska	CHG	
Alaska	SHI	
Japan	WES	
Solomon Is.-New Hebrides	CMC	
Solomon Is.-New Hebrides	BOZ	
Tonga Is.-Fiji Is.	BOZ	
Tonga Is.-Fiji Is.	CMC	

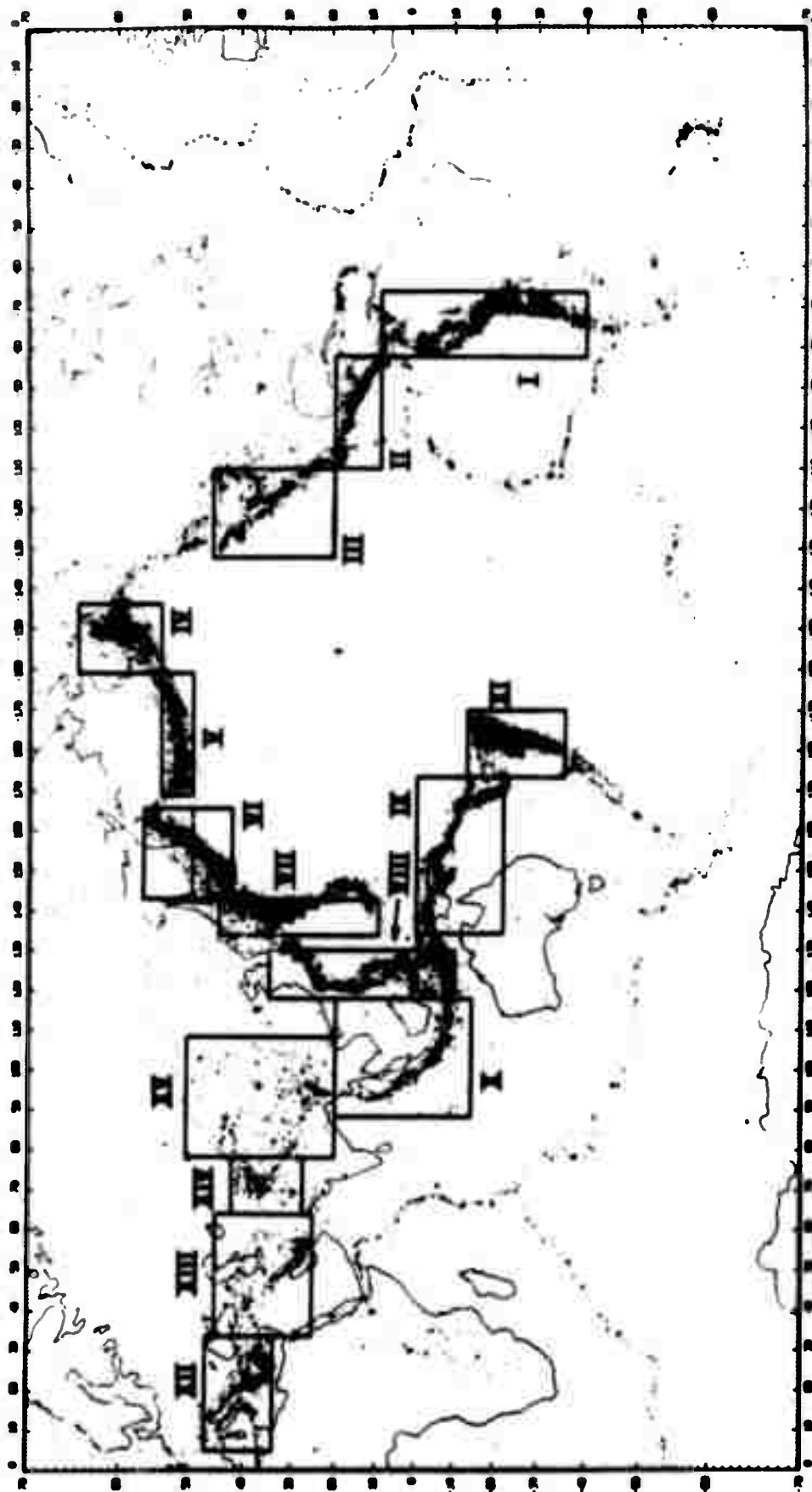


Figure 1. Regions used in coda analysis study.

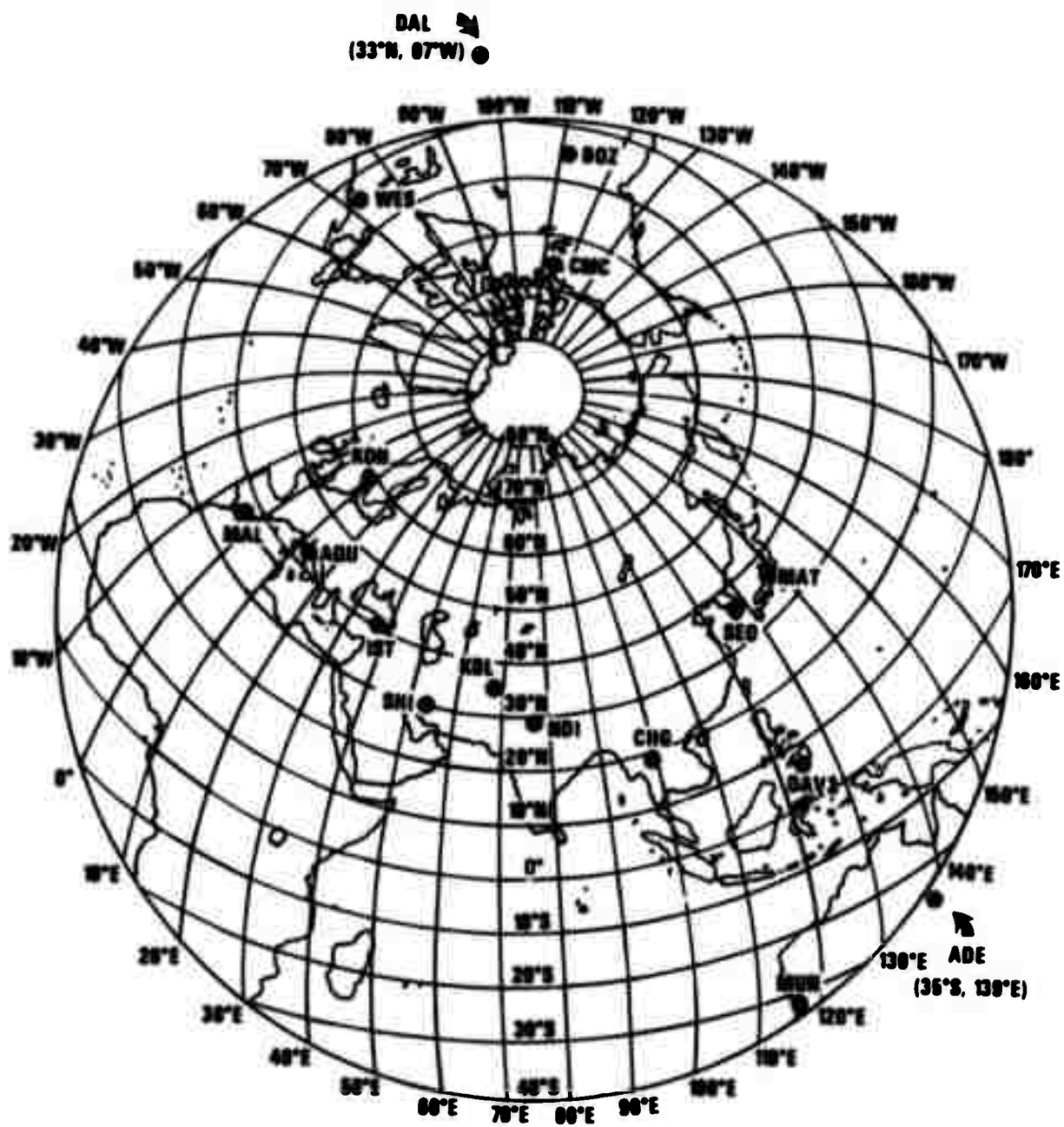


Figure 2. Map showing location of worldwide network.

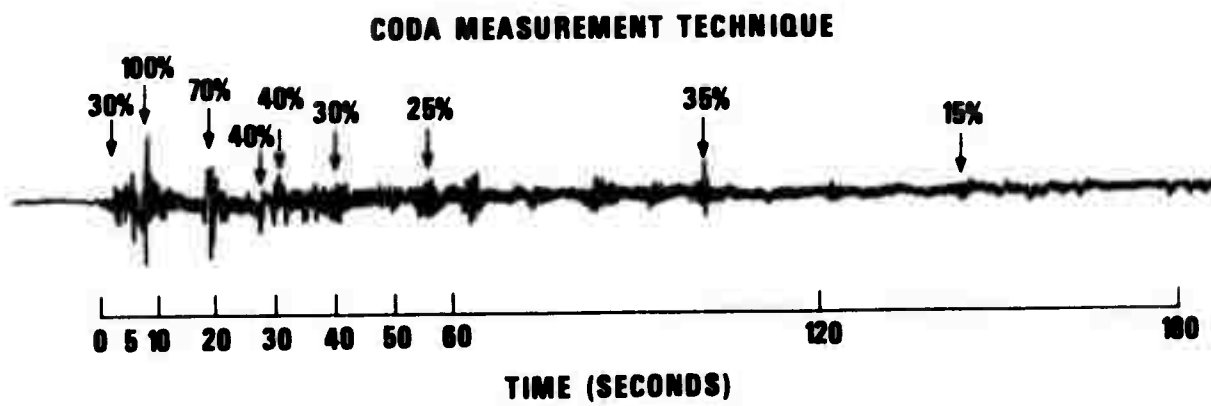


Figure 3. Coda measurement technique.

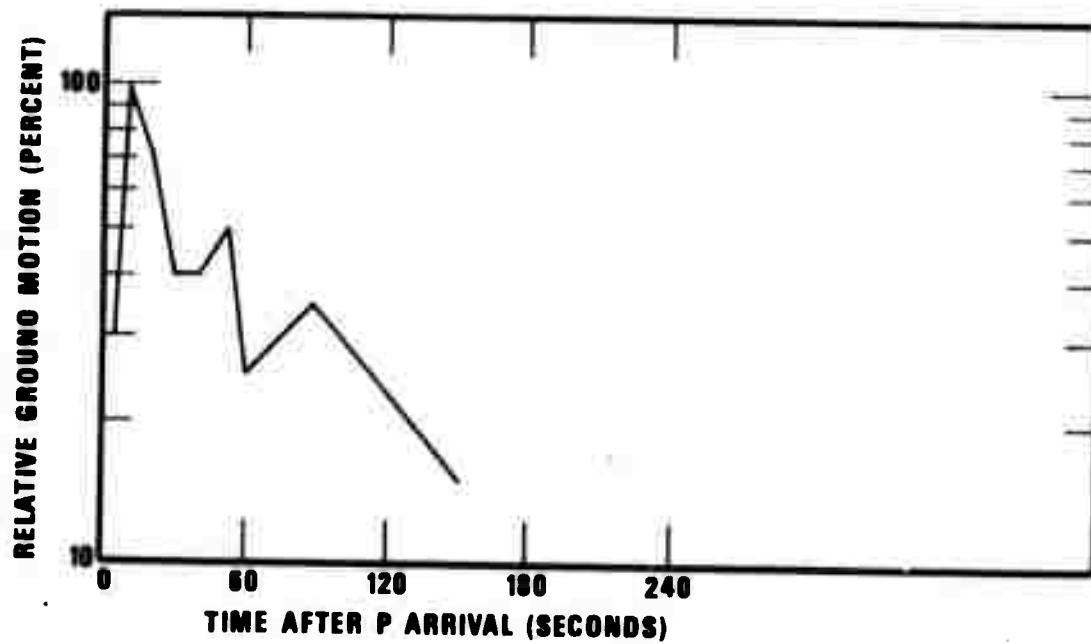


Figure 4a. Single coda determinant.

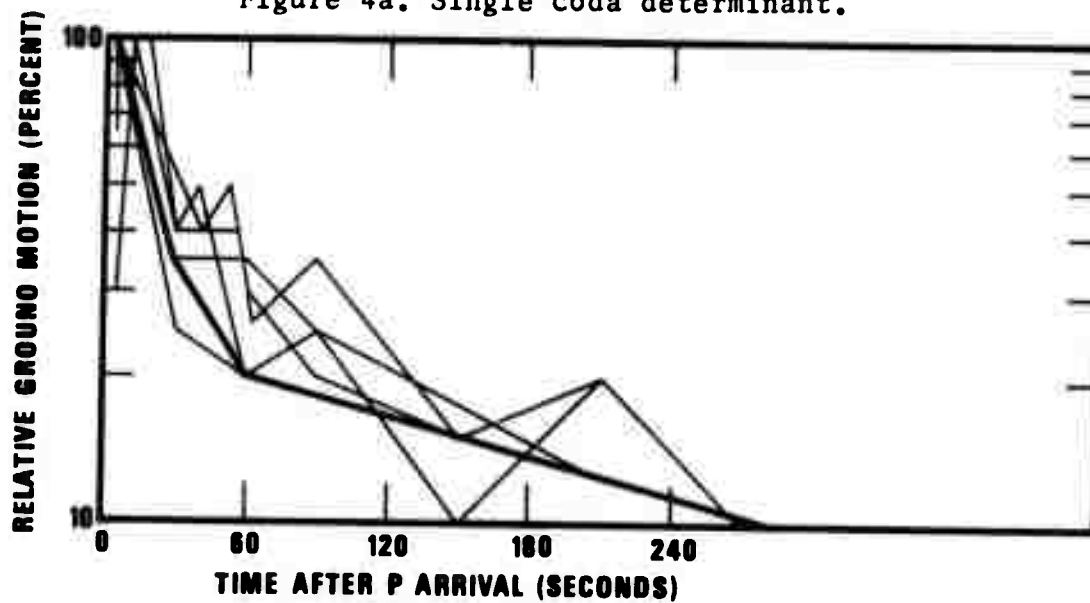


Figure 4b. Determination of representative coda envelope from a set of coda determinations.

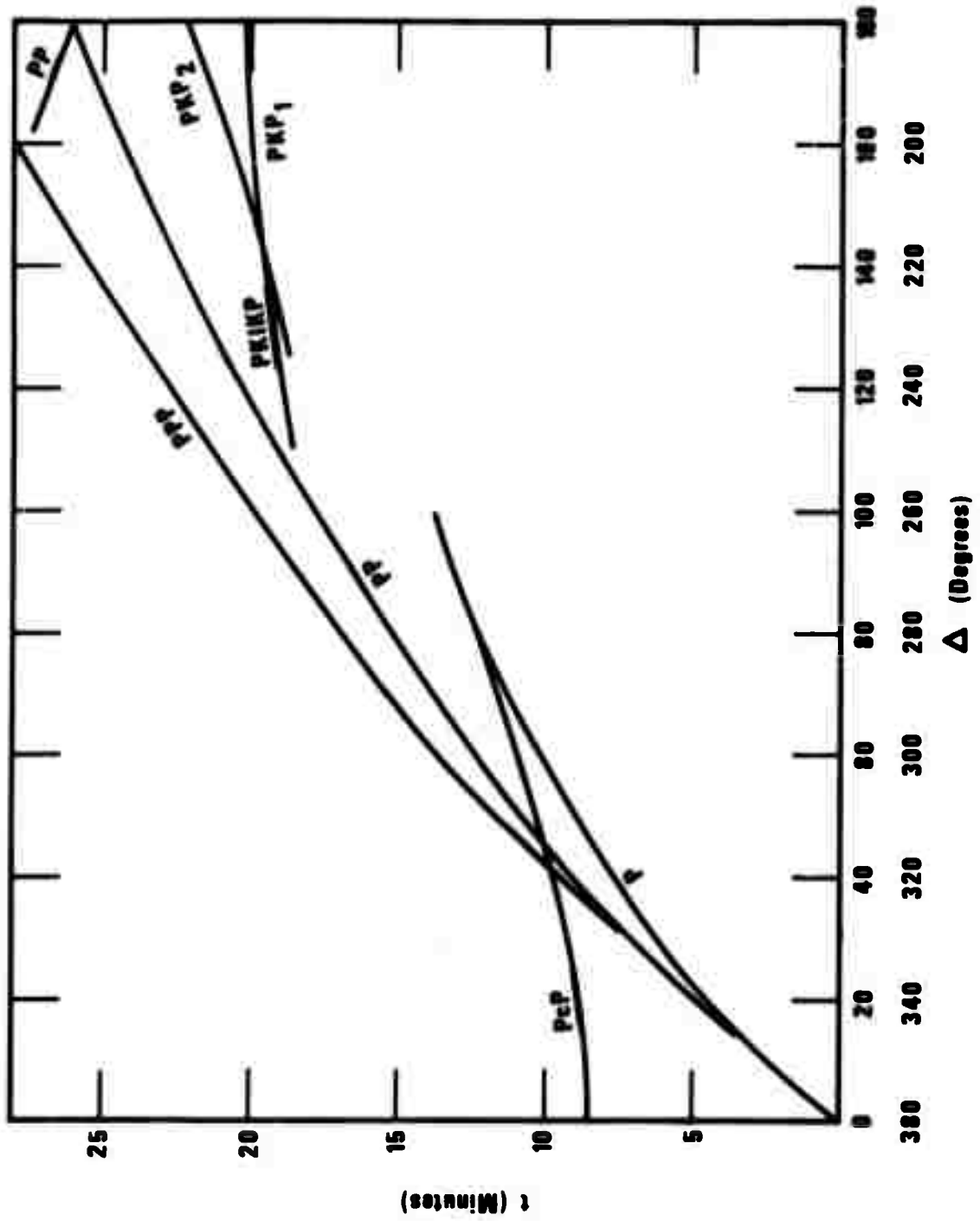


Figure 5. Travel-time curves for P phases.

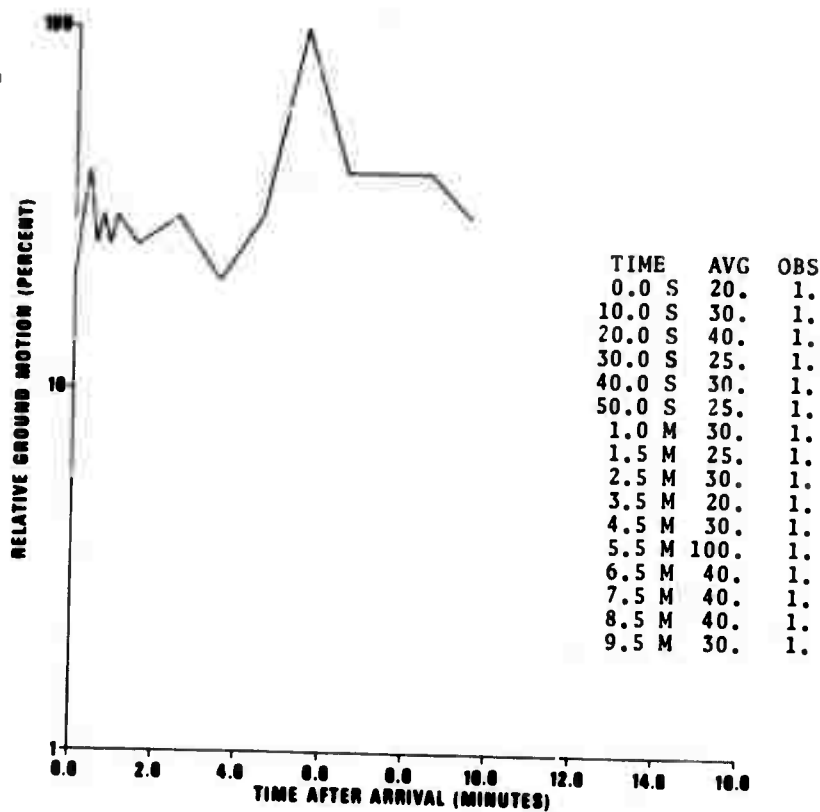


Figure 6. P coda characteristics, South America, ADE.

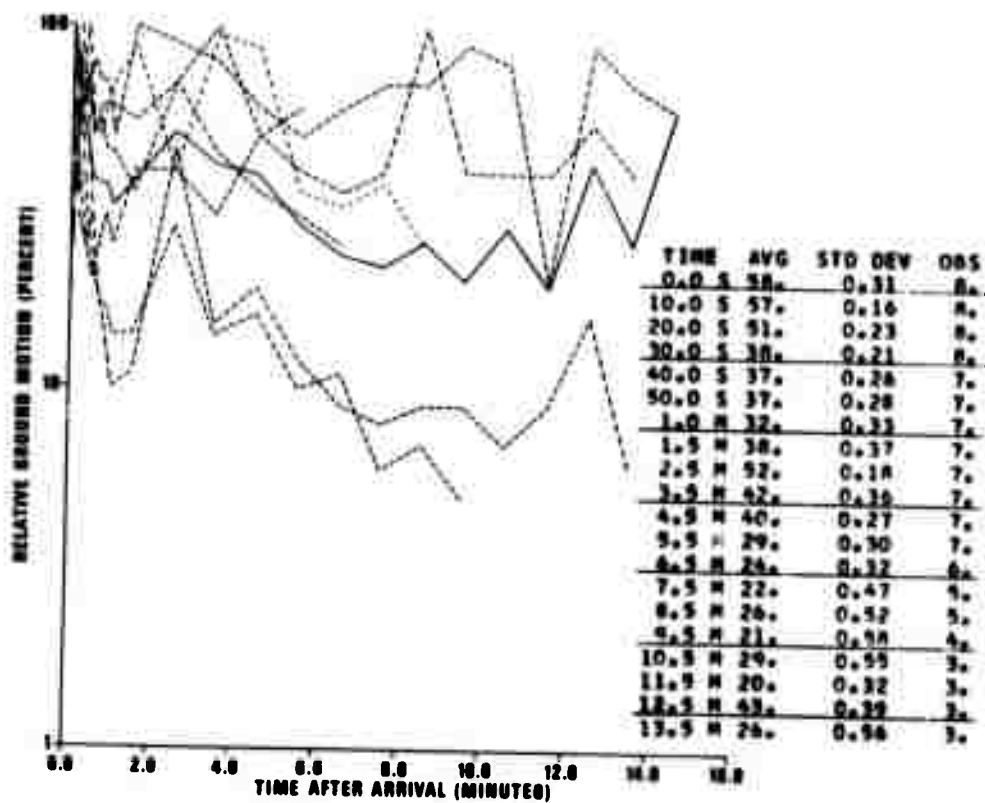


Figure 7. PKP coda characteristics, South America, ADE.

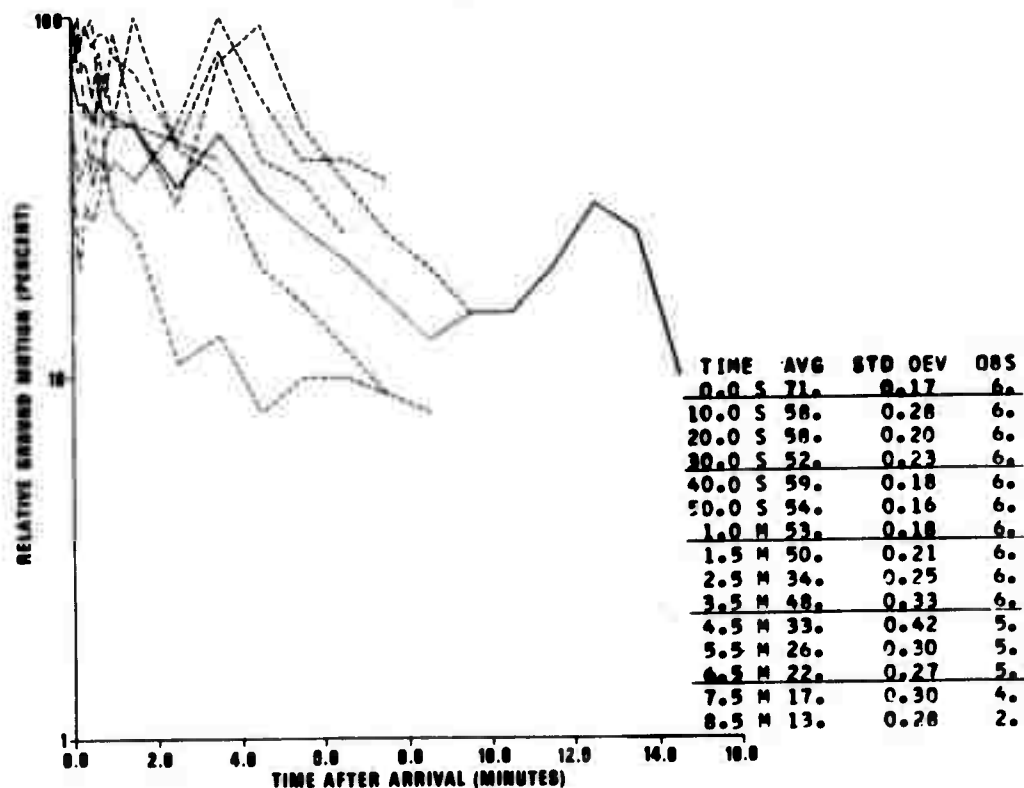


Figure 8. P coda characteristics, South America, AQU.

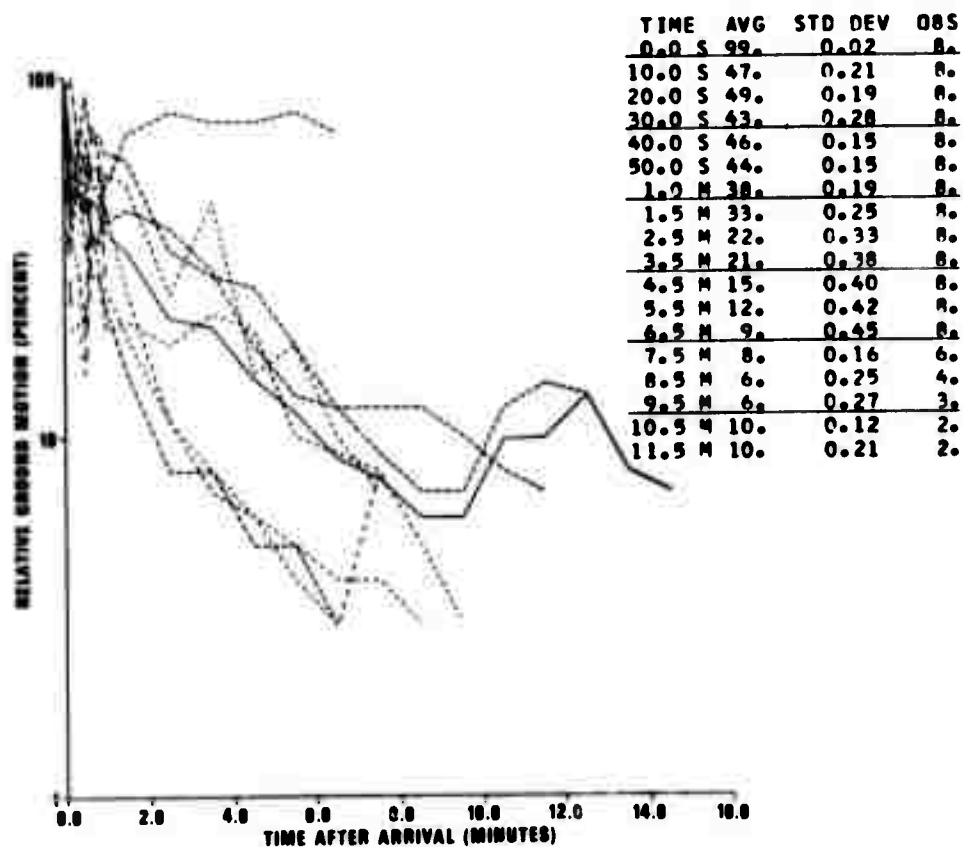


Figure 9. P coda characteristics, South America, BOZ.

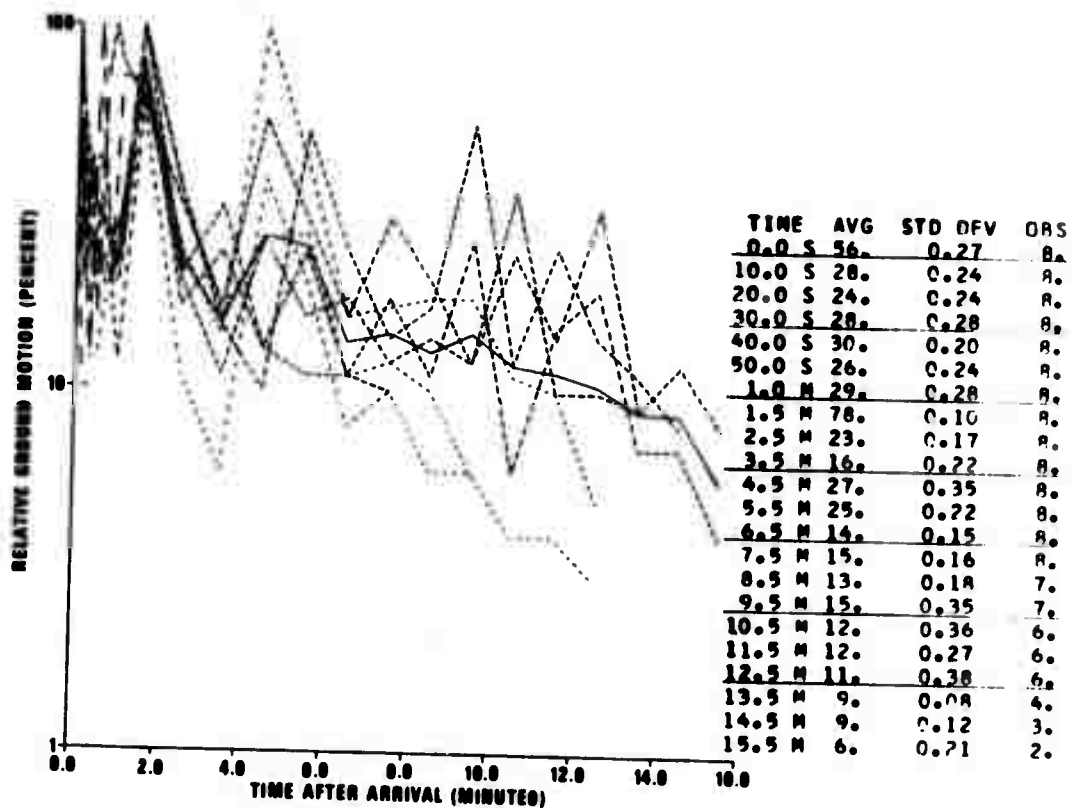


Figure 10. PKP coda characteristics, South America, CHG.

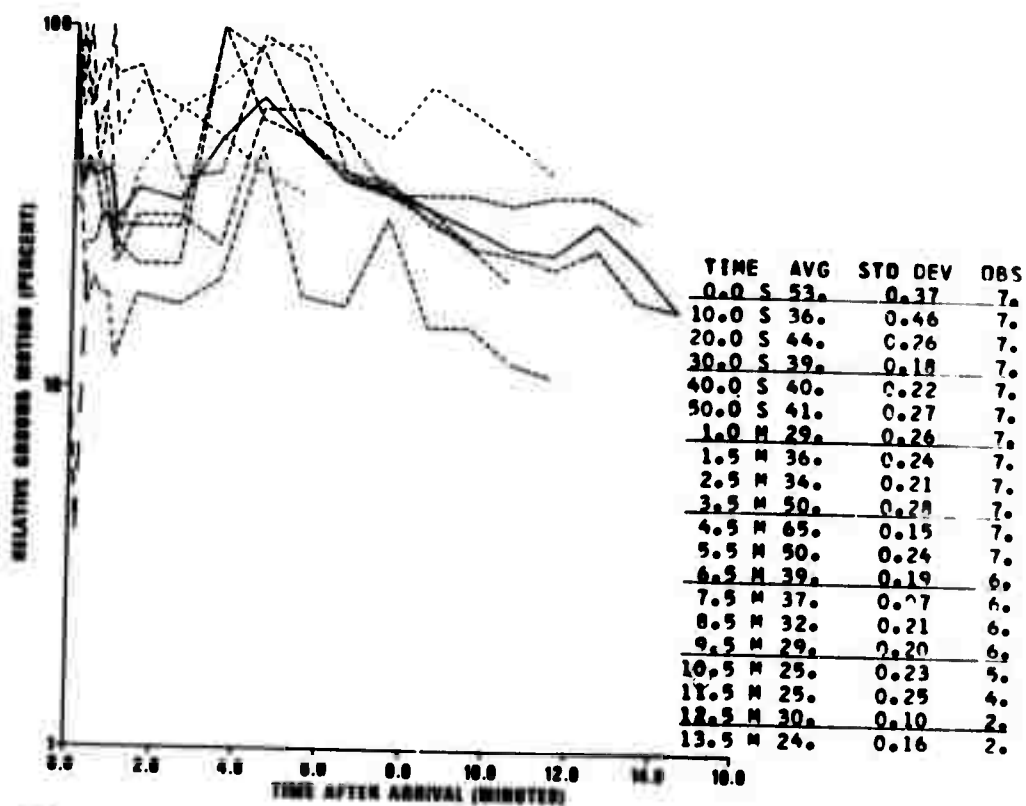


Figure 11. P coda characteristics, South America, CMC.

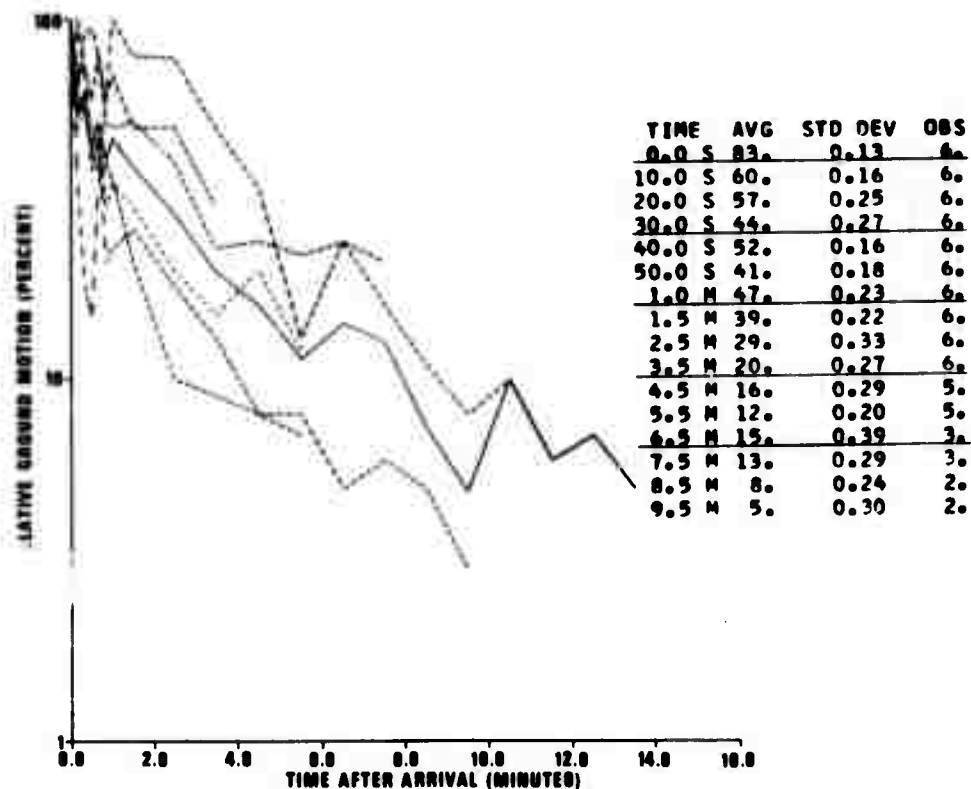


Figure 12. P coda characteristics, South America, DAL.

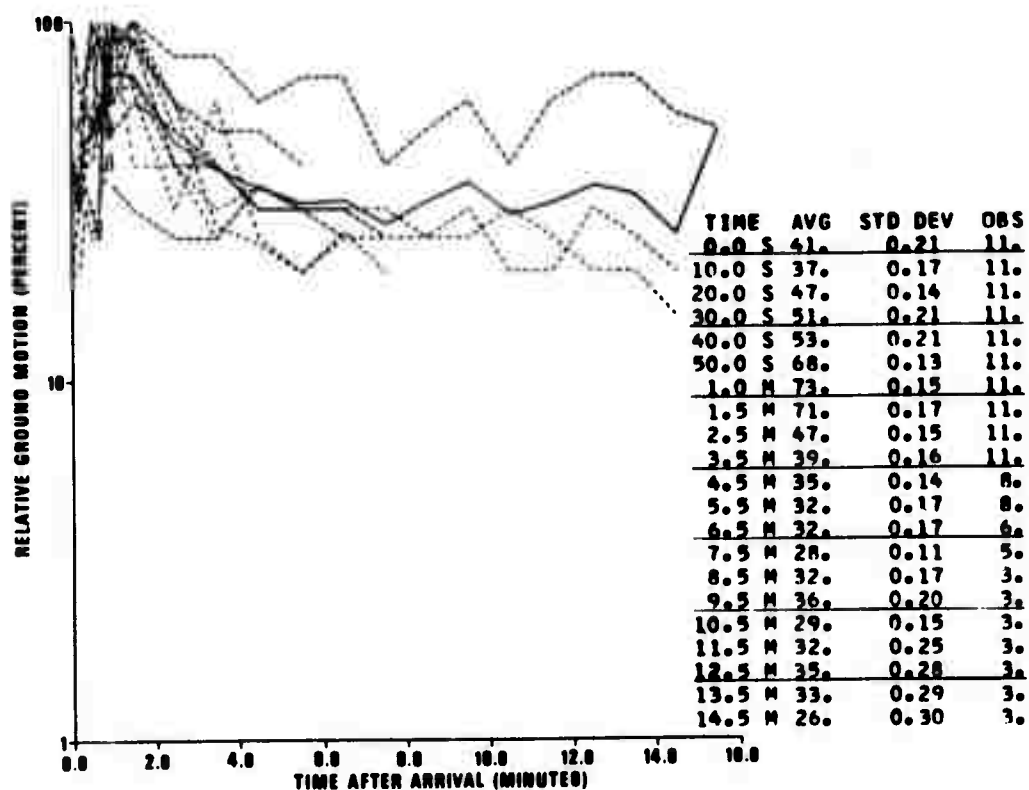


Figure 13. P coda characteristics, South America, DAV.

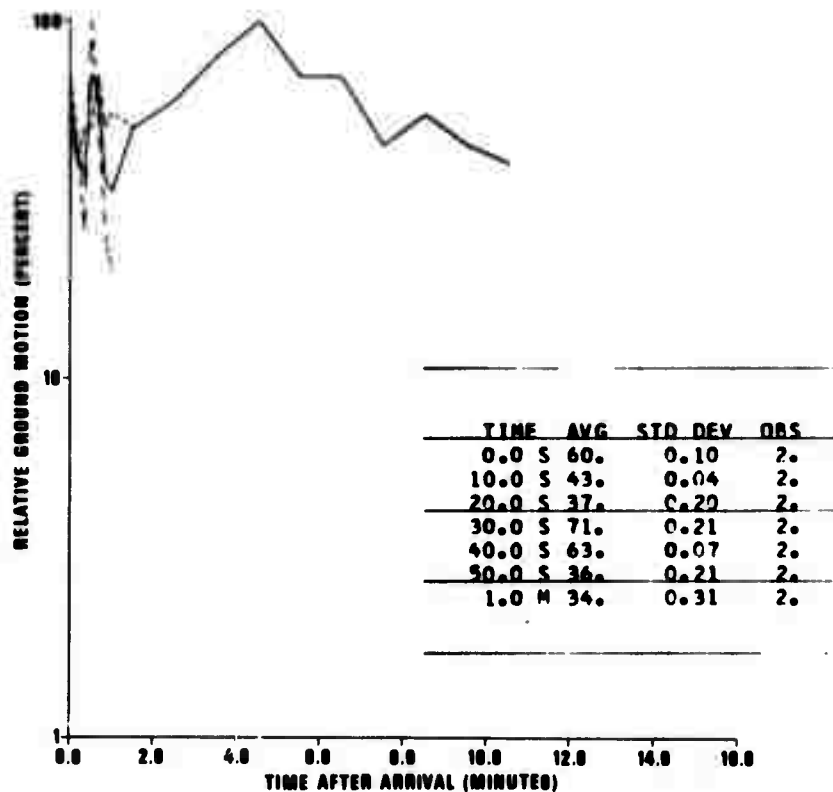


Figure 14. P coda characteristics, South America, IST.

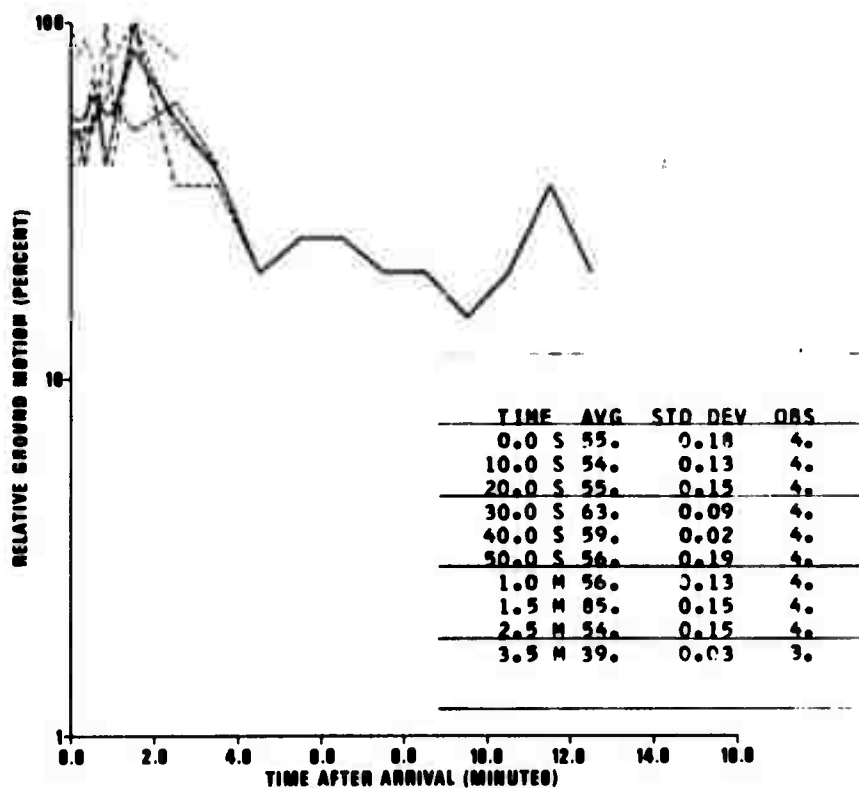


Figure 15. PKP coda characteristics, South America, IST.

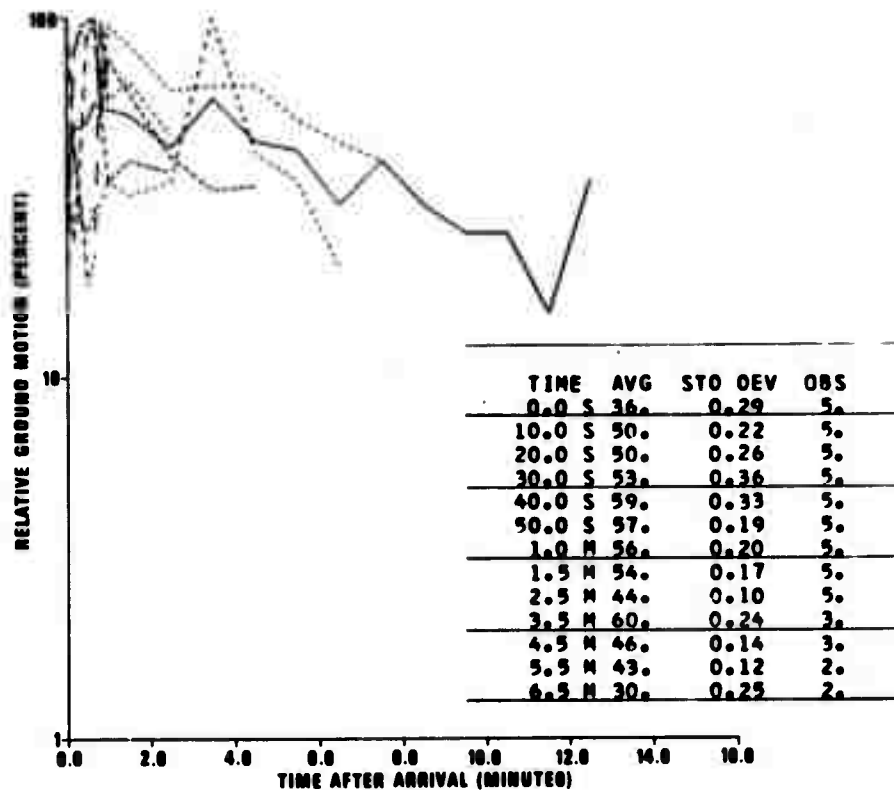


Figure 16. PKP coda characteristics, South America, KBL.

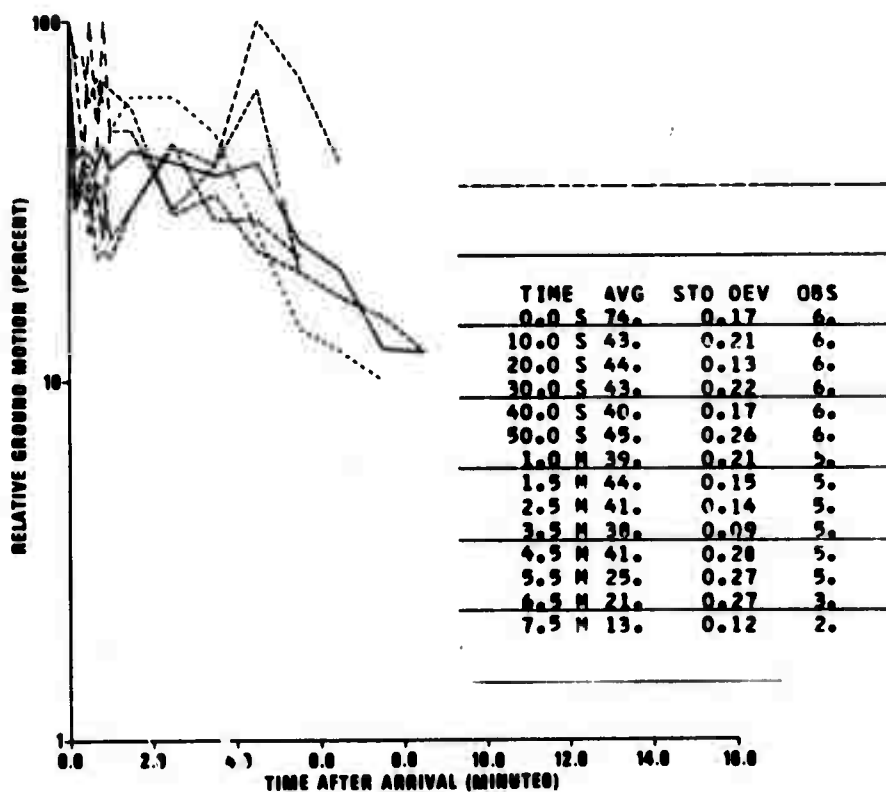


Figure 17. P coda characteristics, South America, KON.

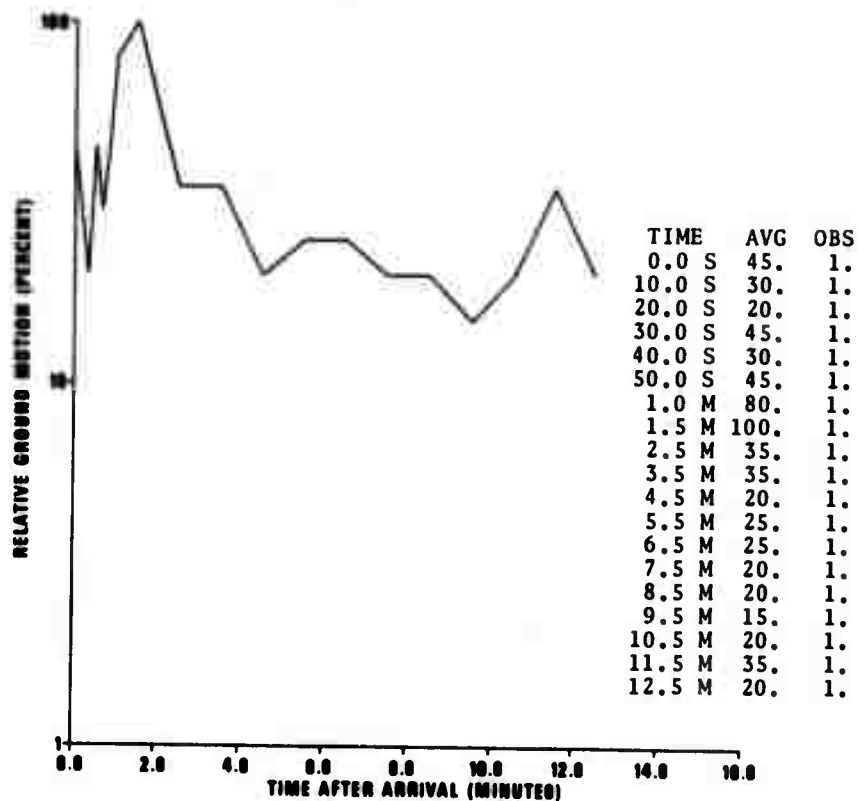


Figure 18. PKP coda characteristics, South America, KON.

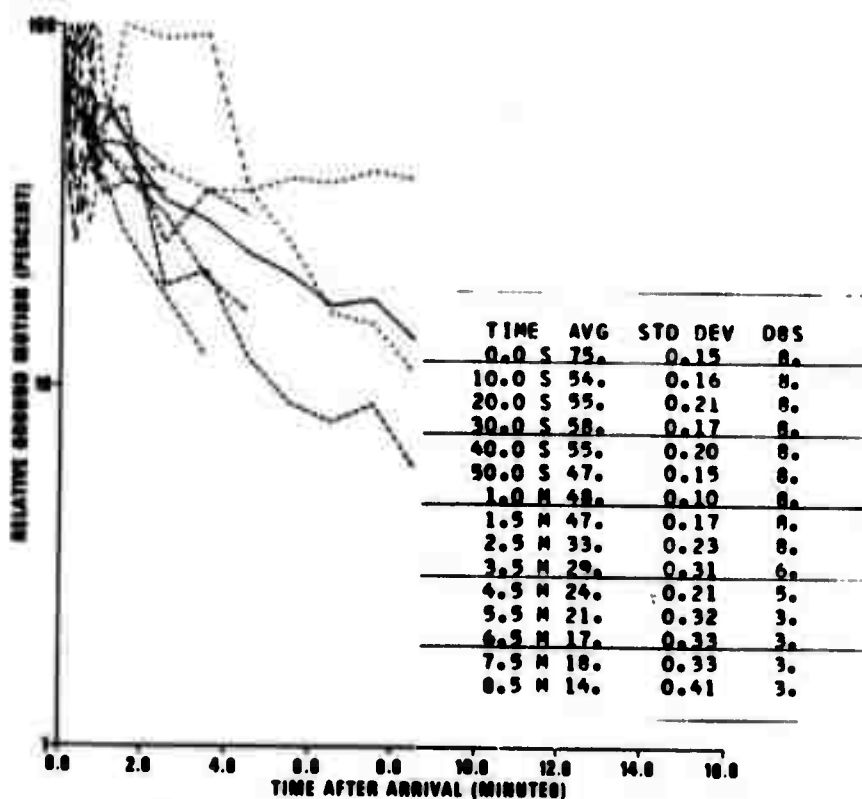


Figure 19. P coda characteristics, South America, MAL.

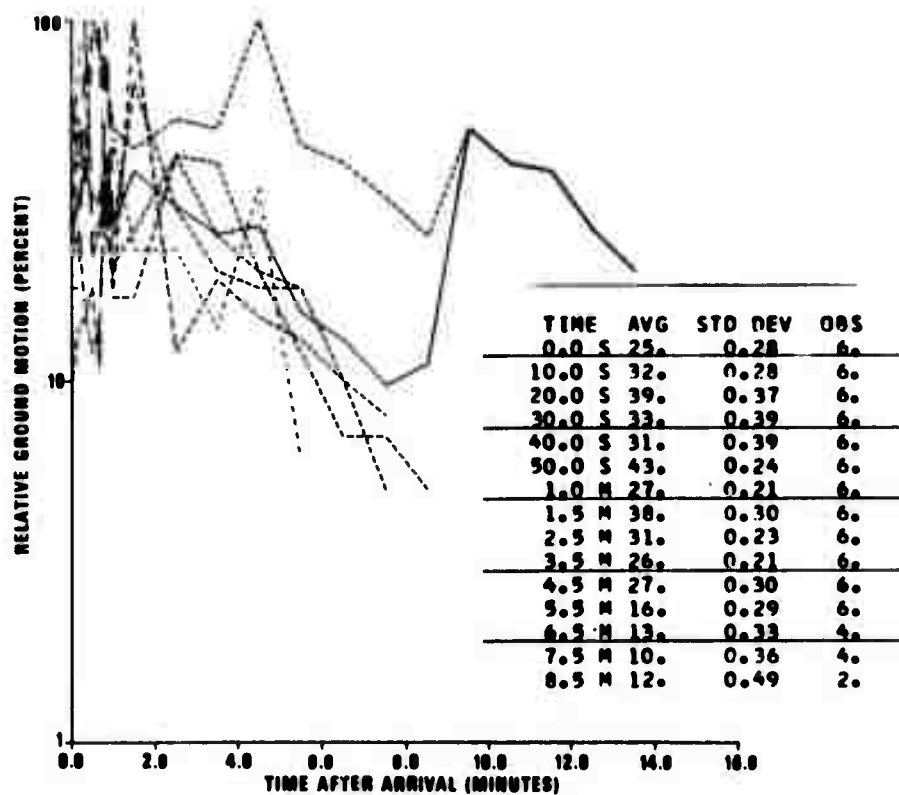


Figure 20. PKP coda characteristics, South America, MAT.

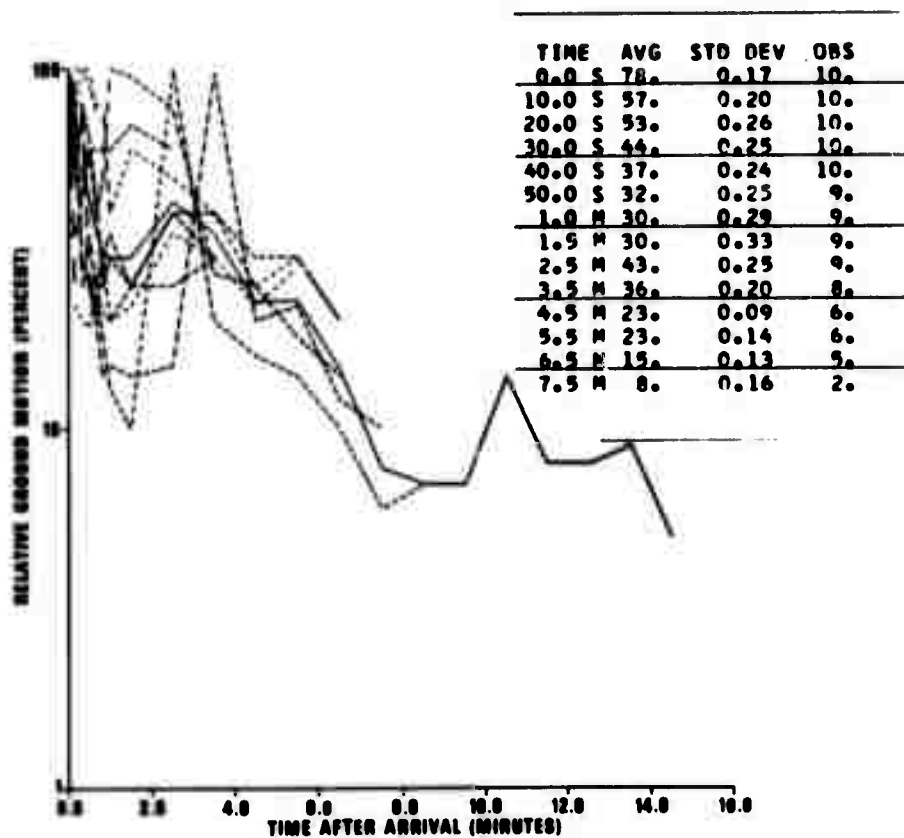


Figure 21. PKP coda characteristics, South America, MUN.

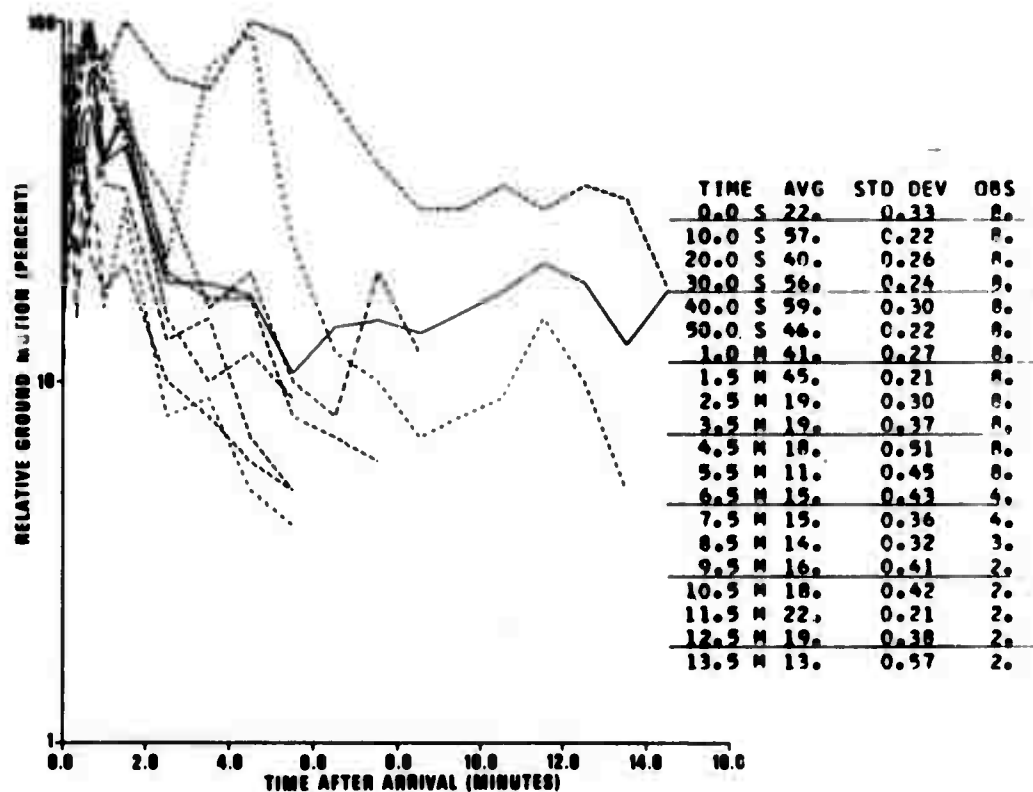


Figure 22. PKP coda characteristics, South America, NDI.

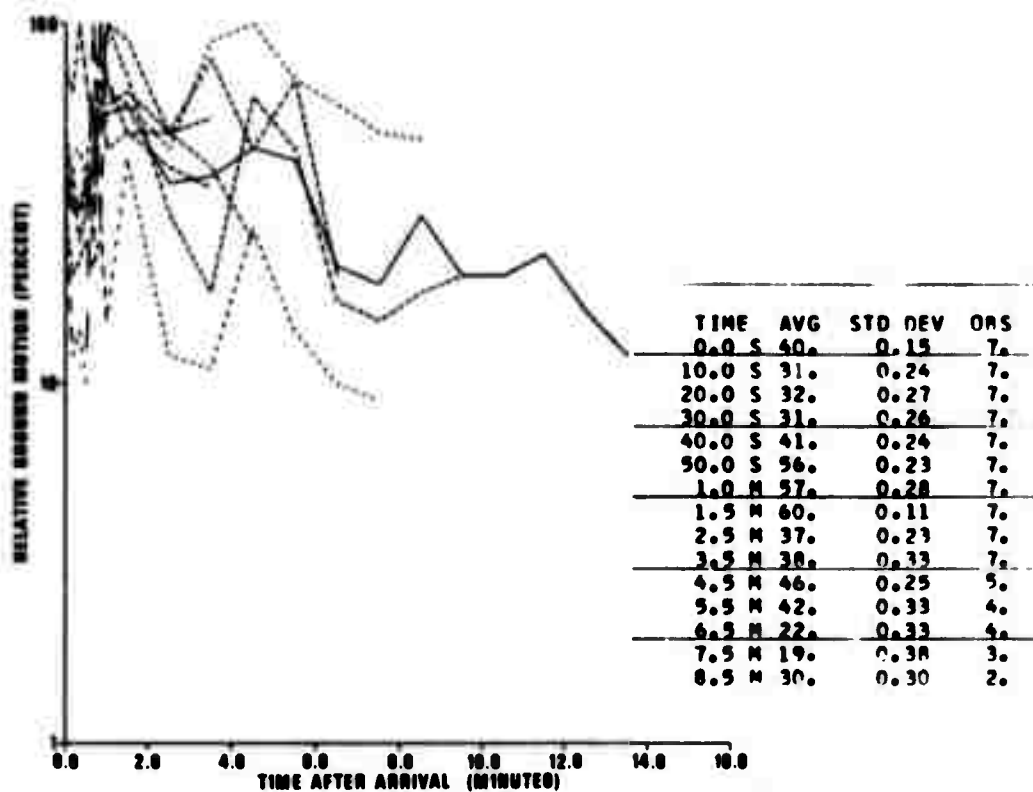


Figure 23. PKP coda characteristics, South America, SEO.

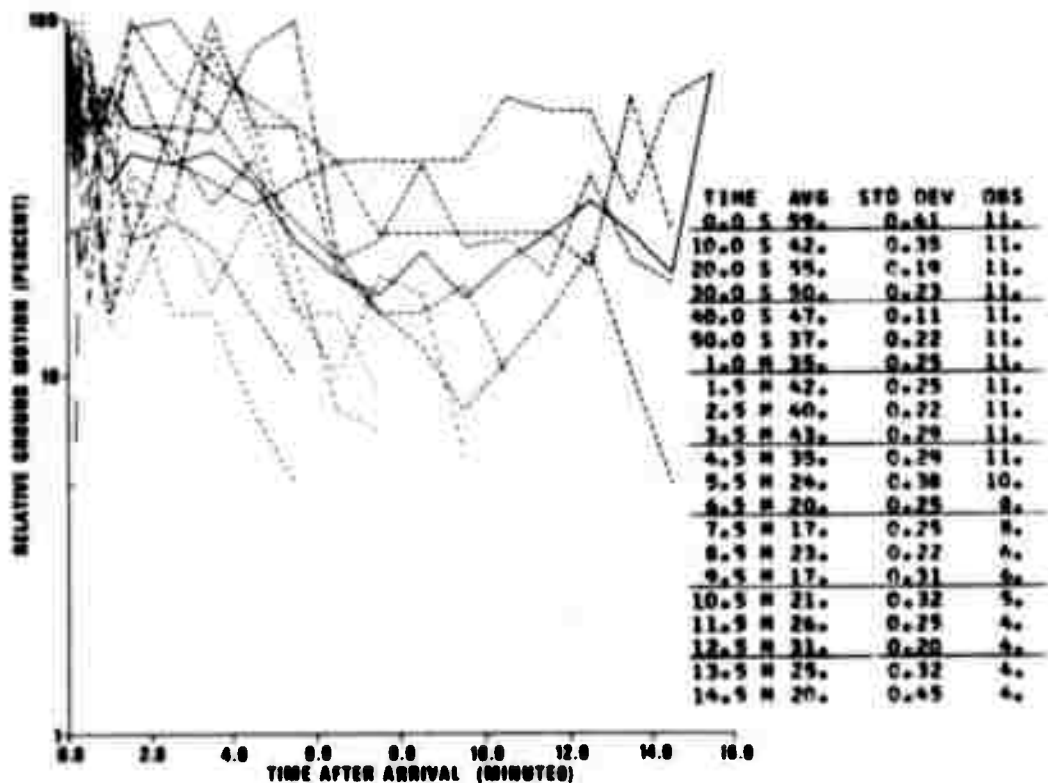


Figure 24. PKP coda characteristics, South America, SHI.

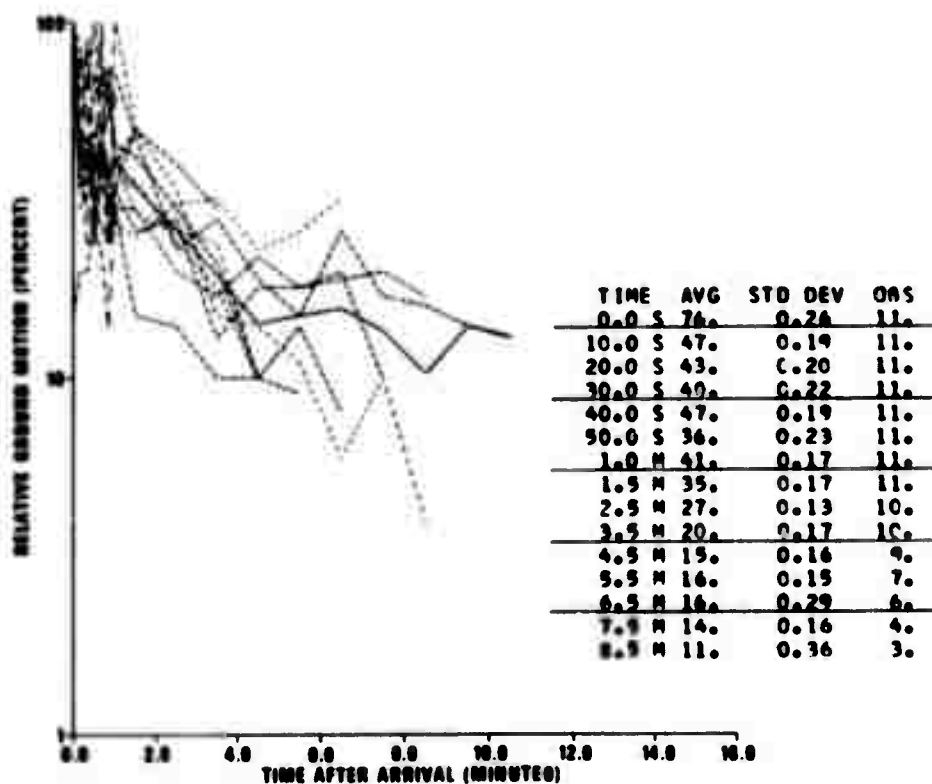


Figure 25. P coda characteristics, South America, WES.

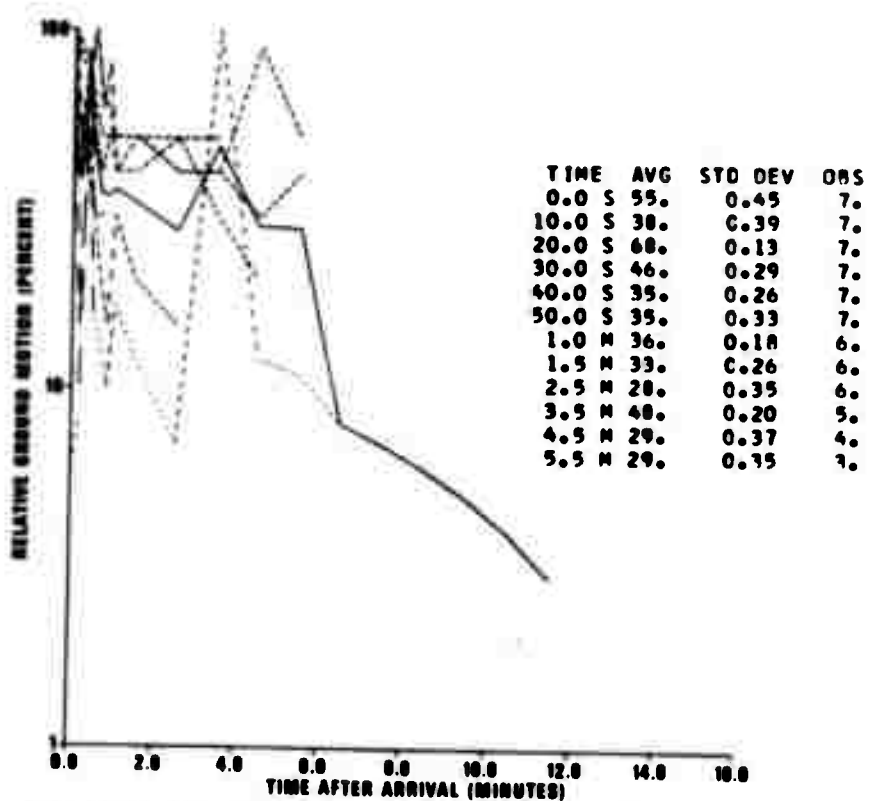


Figure 26. PKP coda characteristics, Central America, ADE.

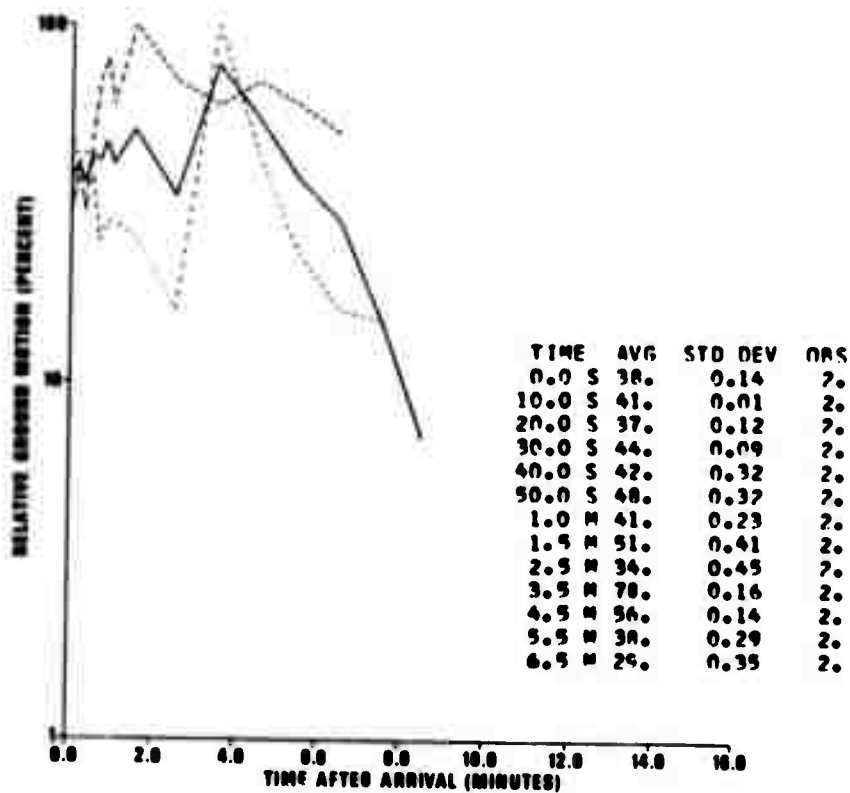


Figure 27. P coda characteristics, Central America, AQU.

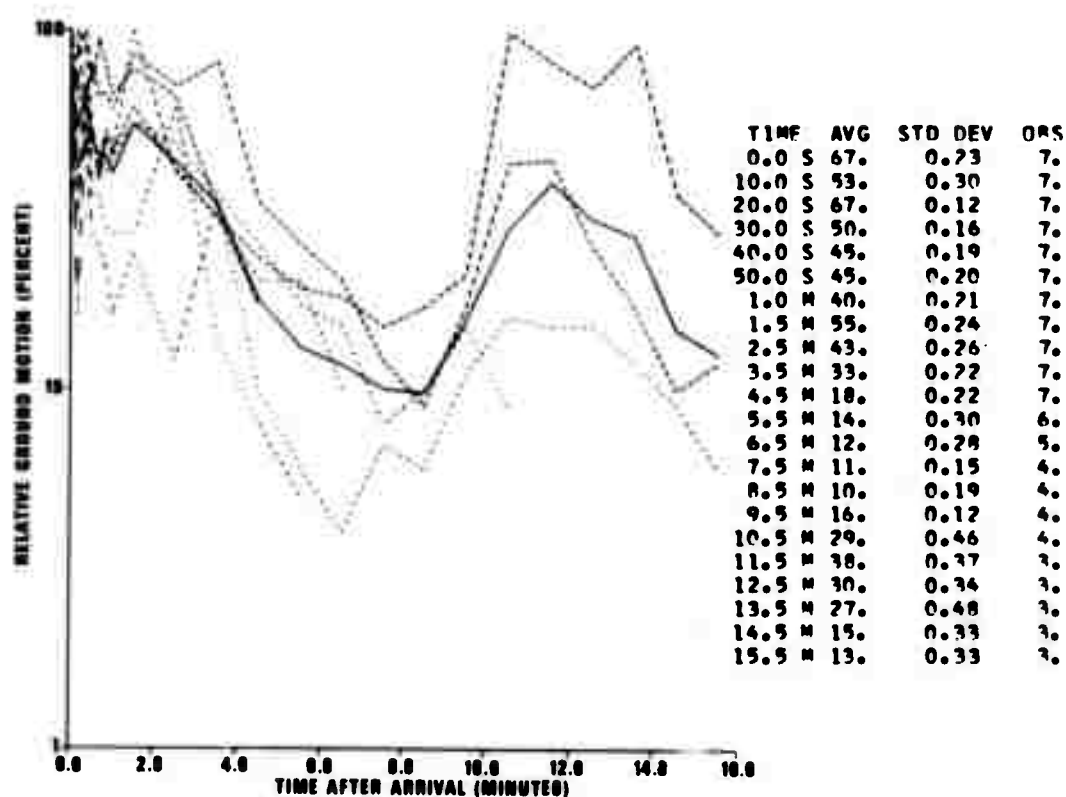


Figure 28. P coda characteristics, Central America, BOZ.

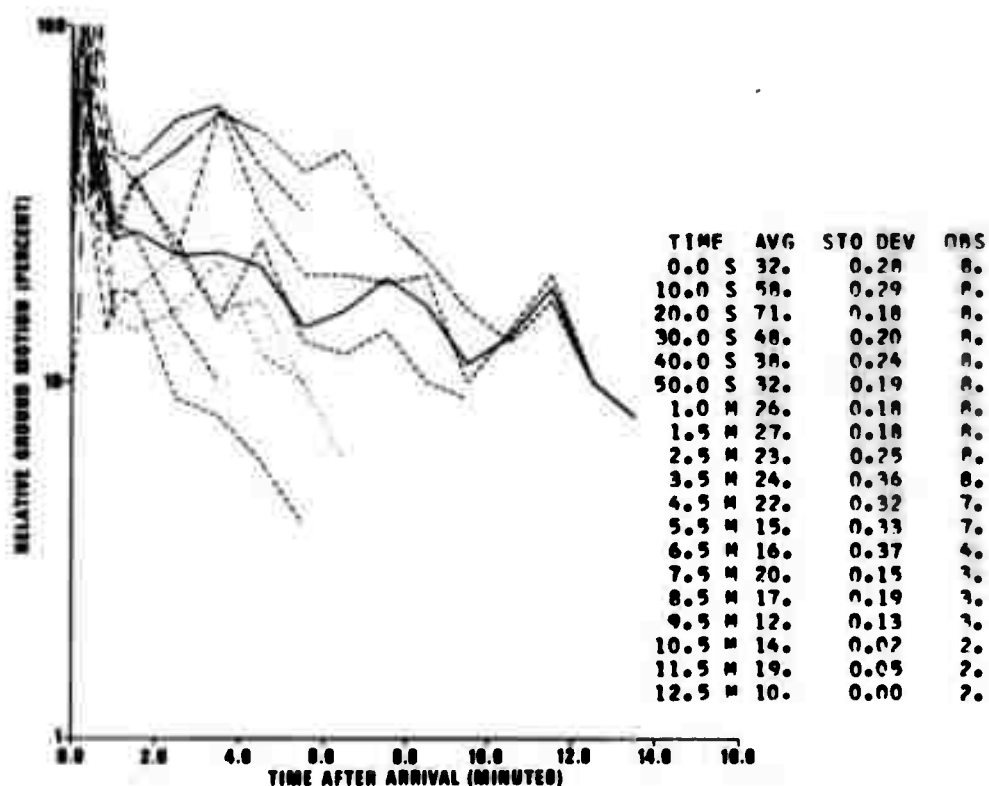


Figure 29. PKP coda characteristics, Central America, CHG.

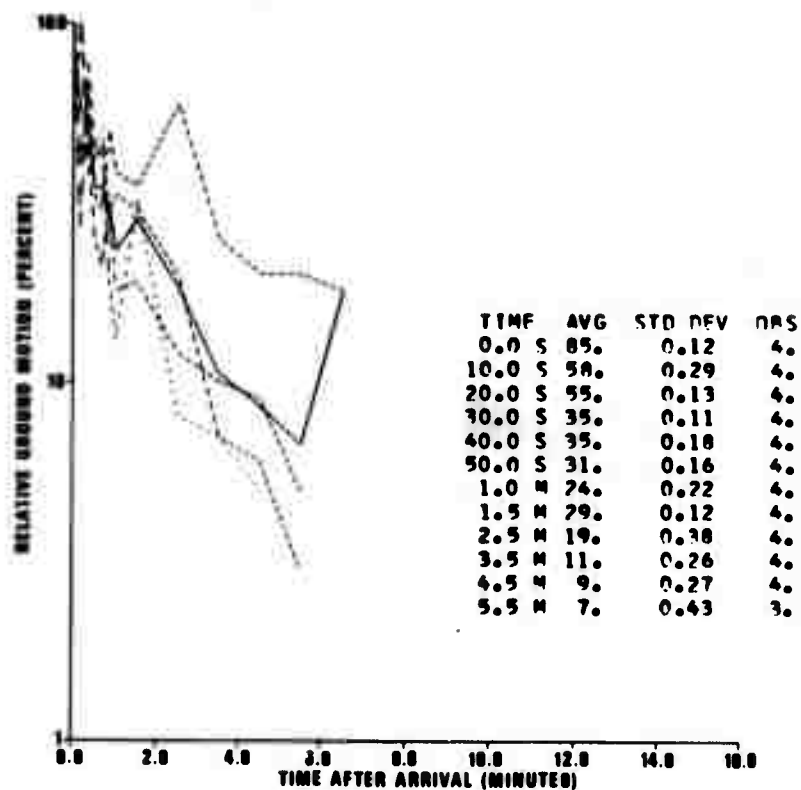


Figure 30. P coda characteristics, Central America, CMC.

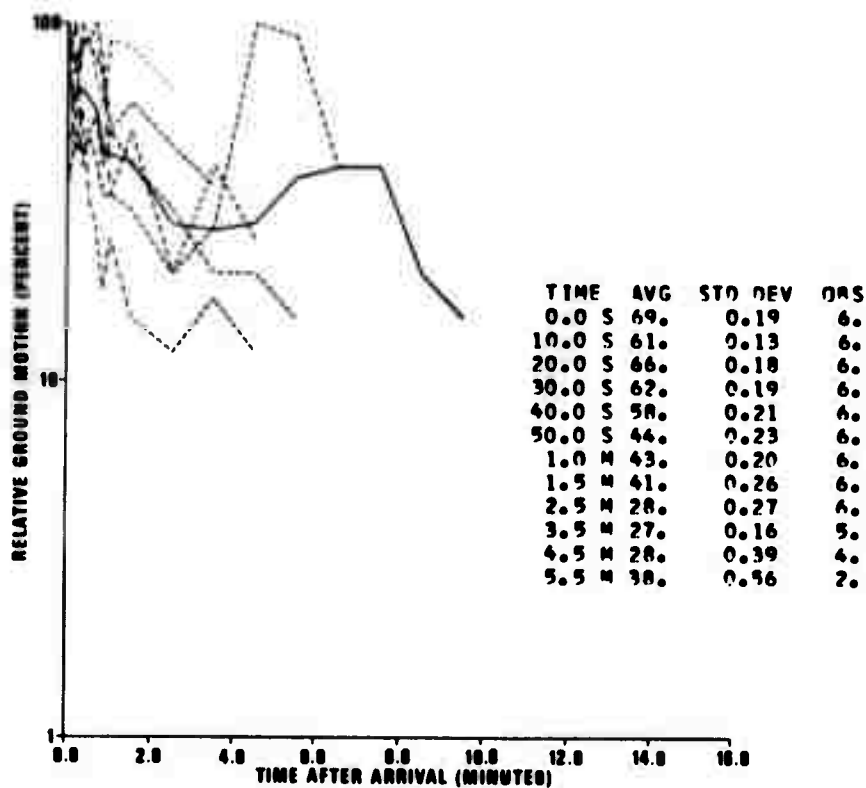


Figure 31. P coda characteristics, Central America, DAL.

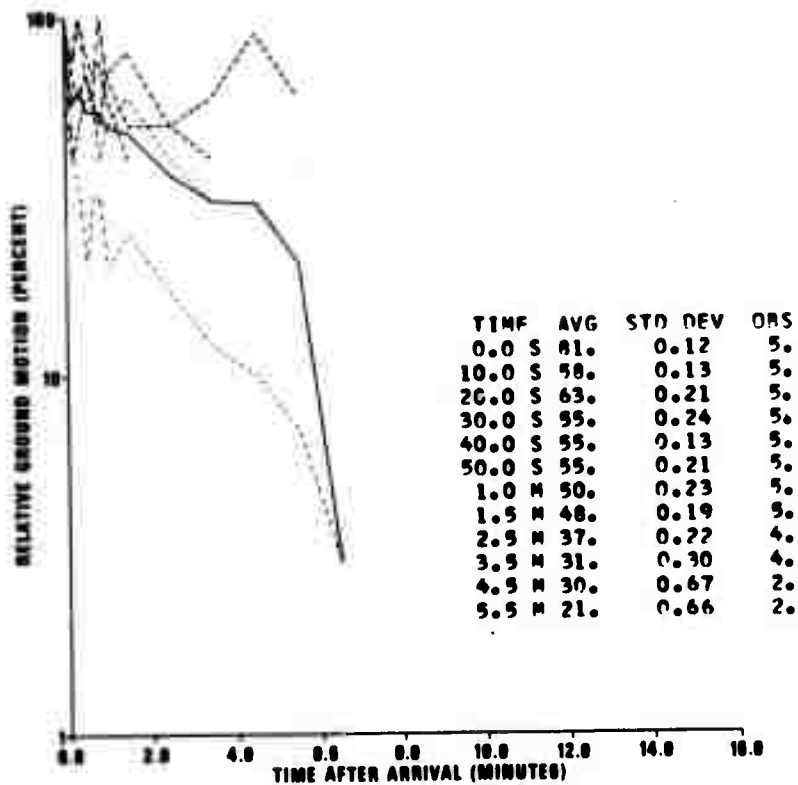


Figure 32. PKP coda characteristics, Central America, DAV.

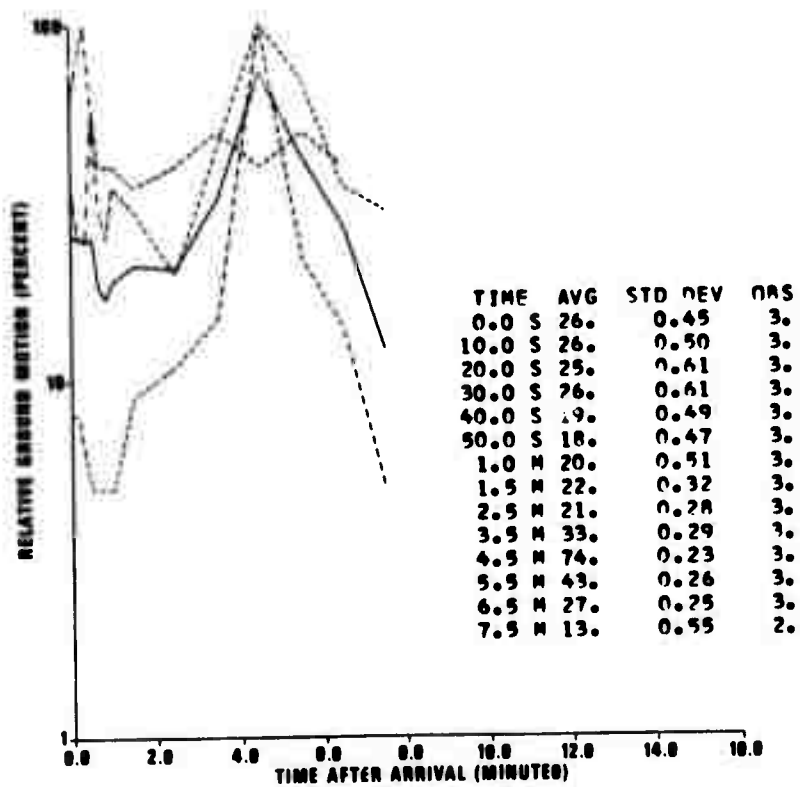


Figure 33. P coda characteristics, Central America, IST.

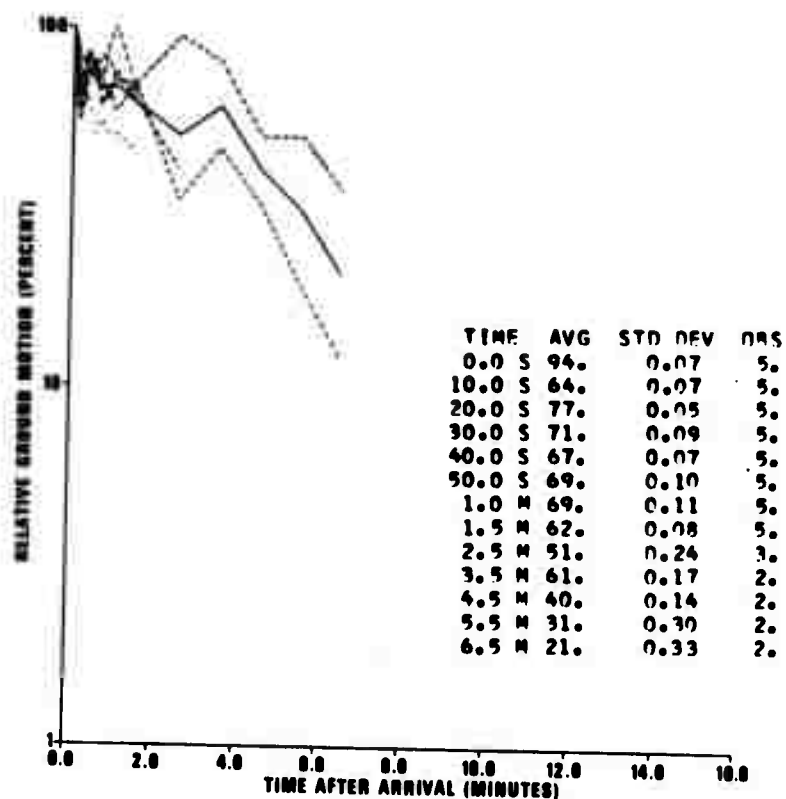


Figure 34. PKP coda characteristics, Central America, KBL.

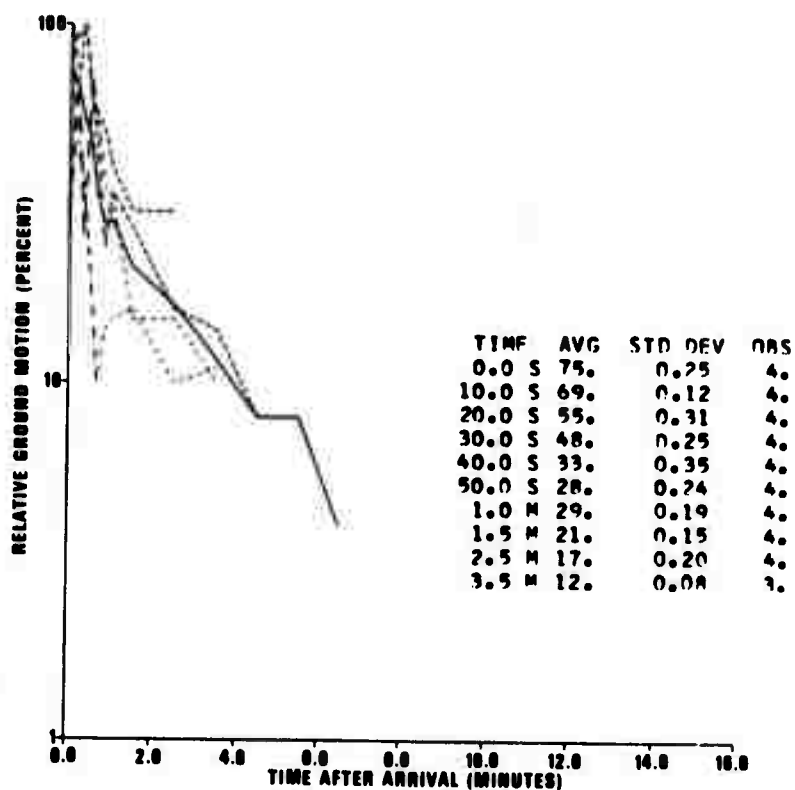


Figure 35. P coda characteristics, Central America, KON.

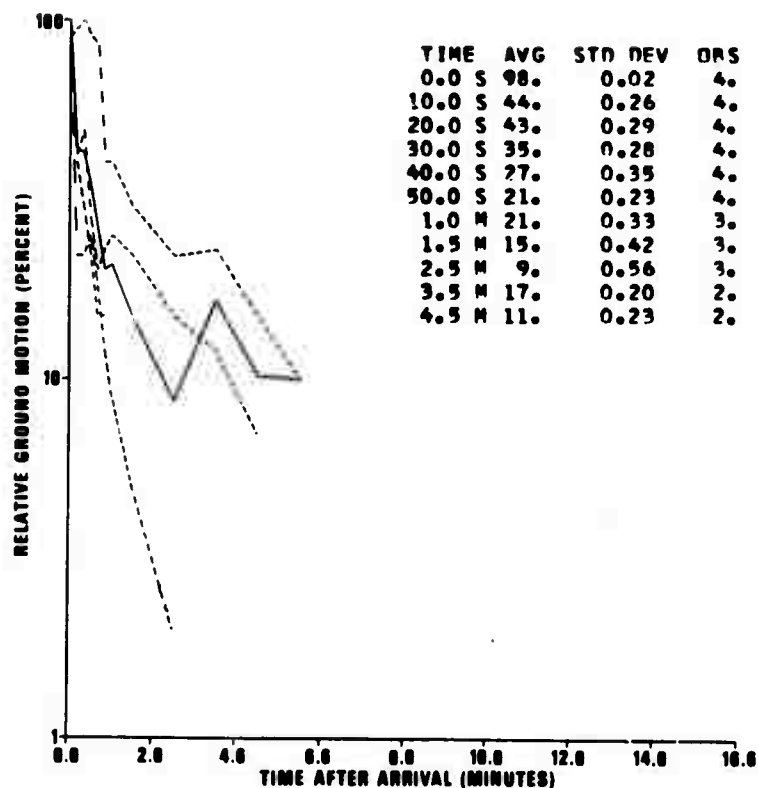


Figure 36. P coda characteristics, Central America, MAL.

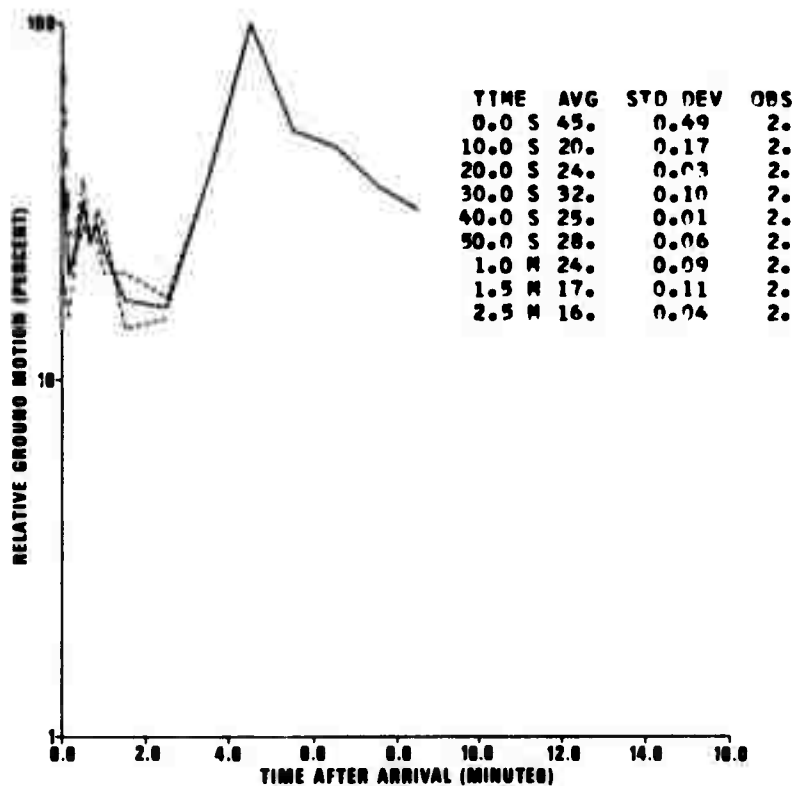


Figure 37. P coda characteristics, Central America, MAT.

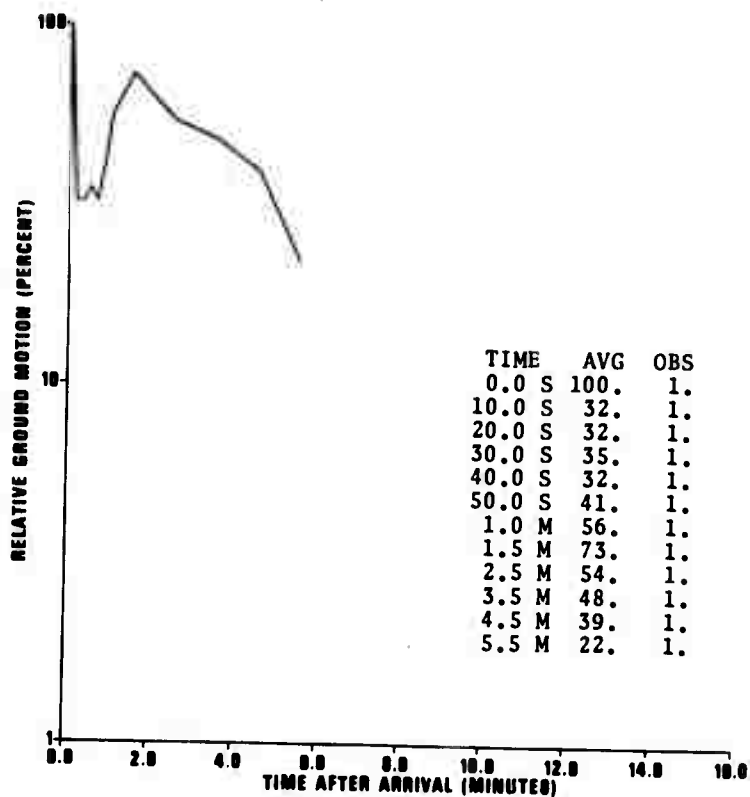


Figure 38. PKP coda characteristics, Central America, MAT.

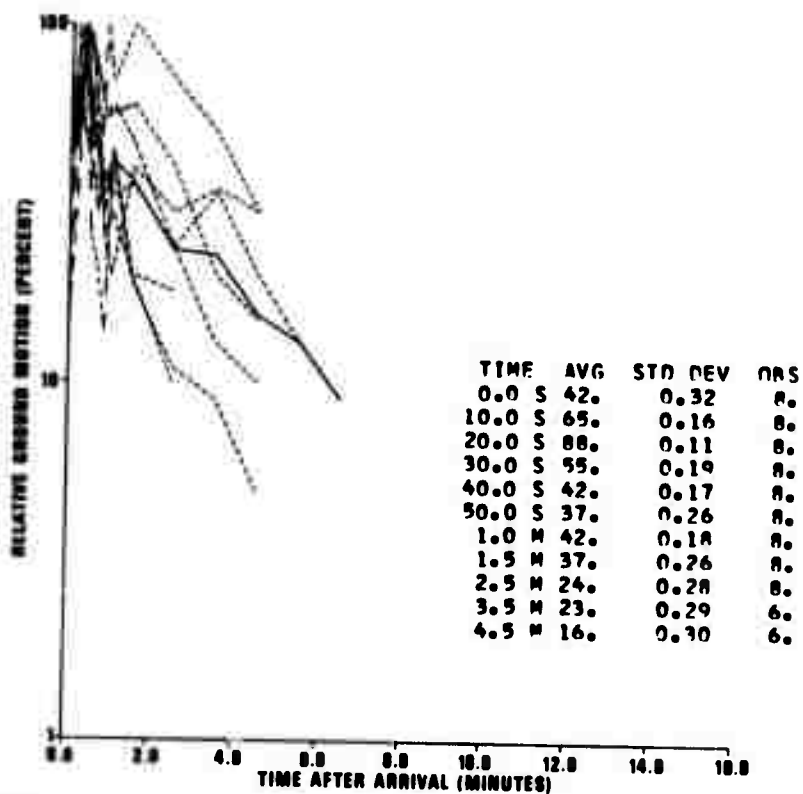


Figure 39. PKP coda characteristics, Central America, MUN.

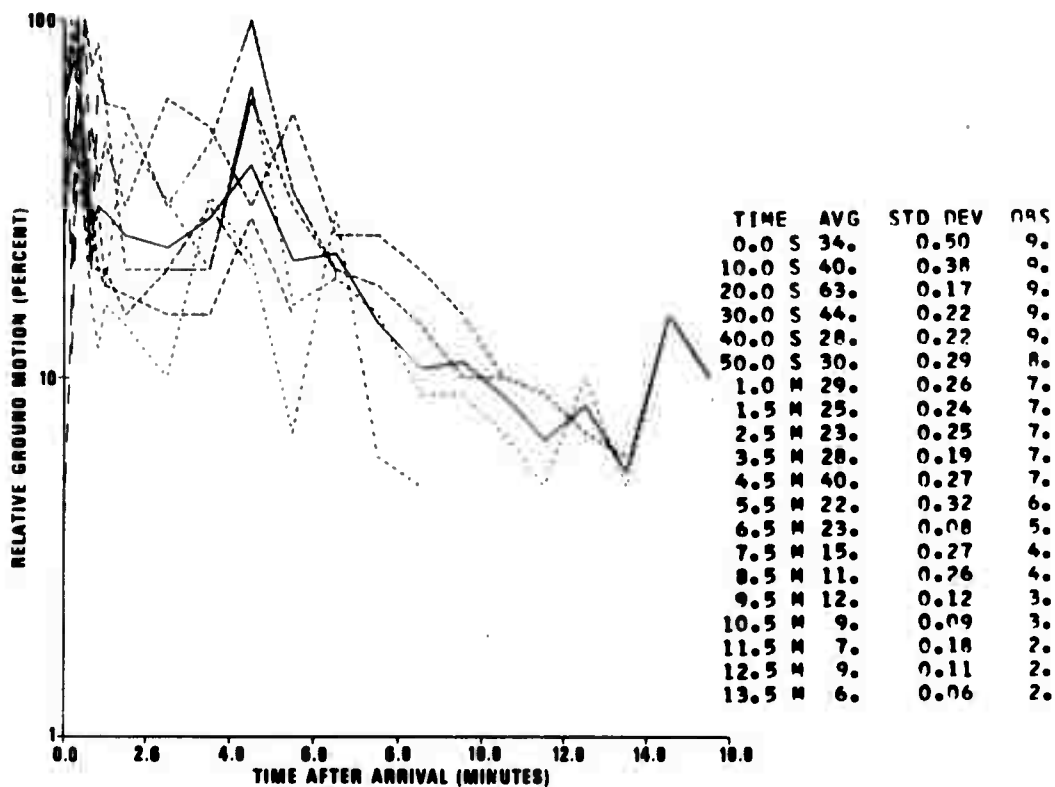


Figure 40. PKP coda characteristics, Central America, NDI.

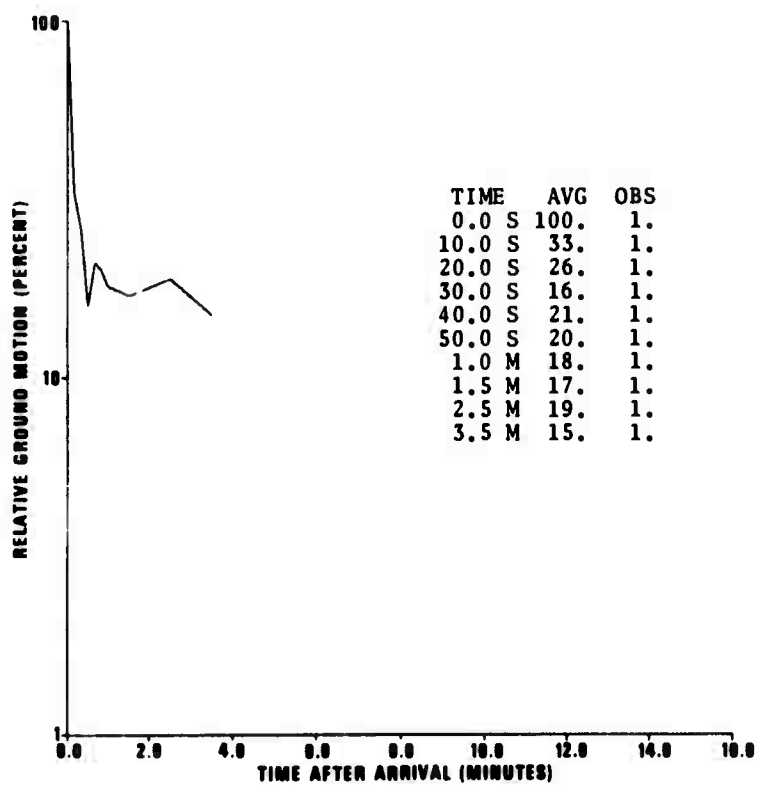


Figure 41. PKP coda characteristics, Central America, SEO.

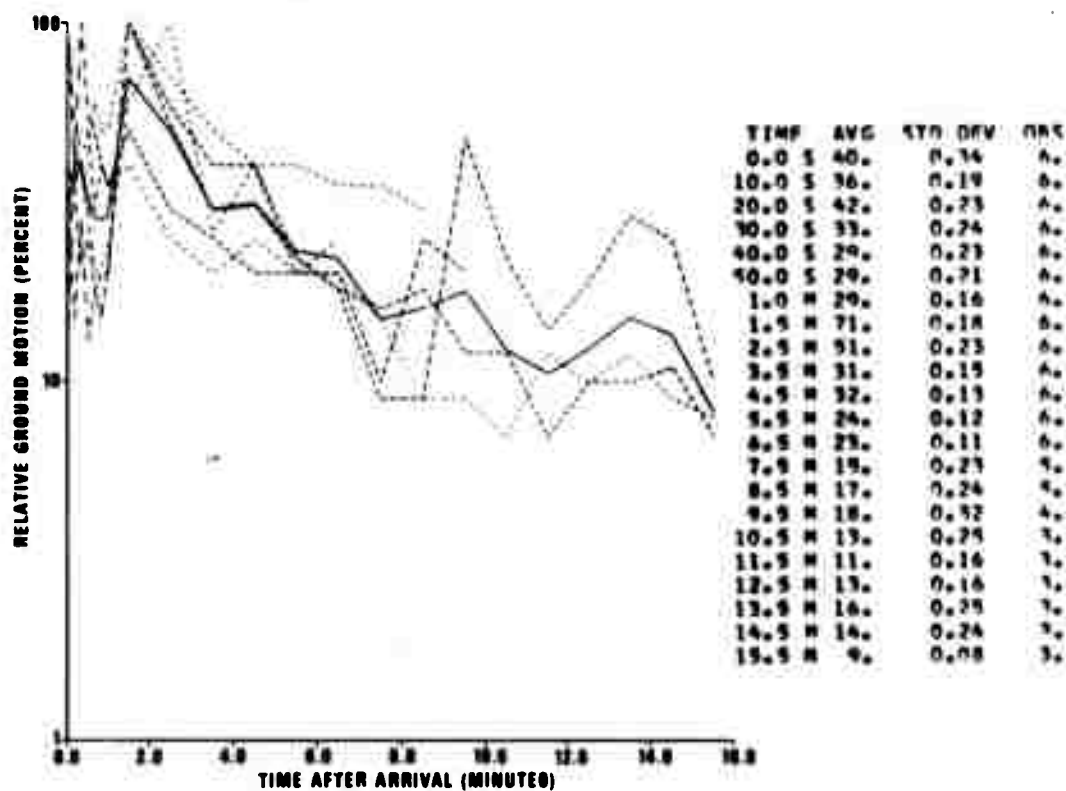


Figure 42. PKP coda characteristics, Central America, SHI.

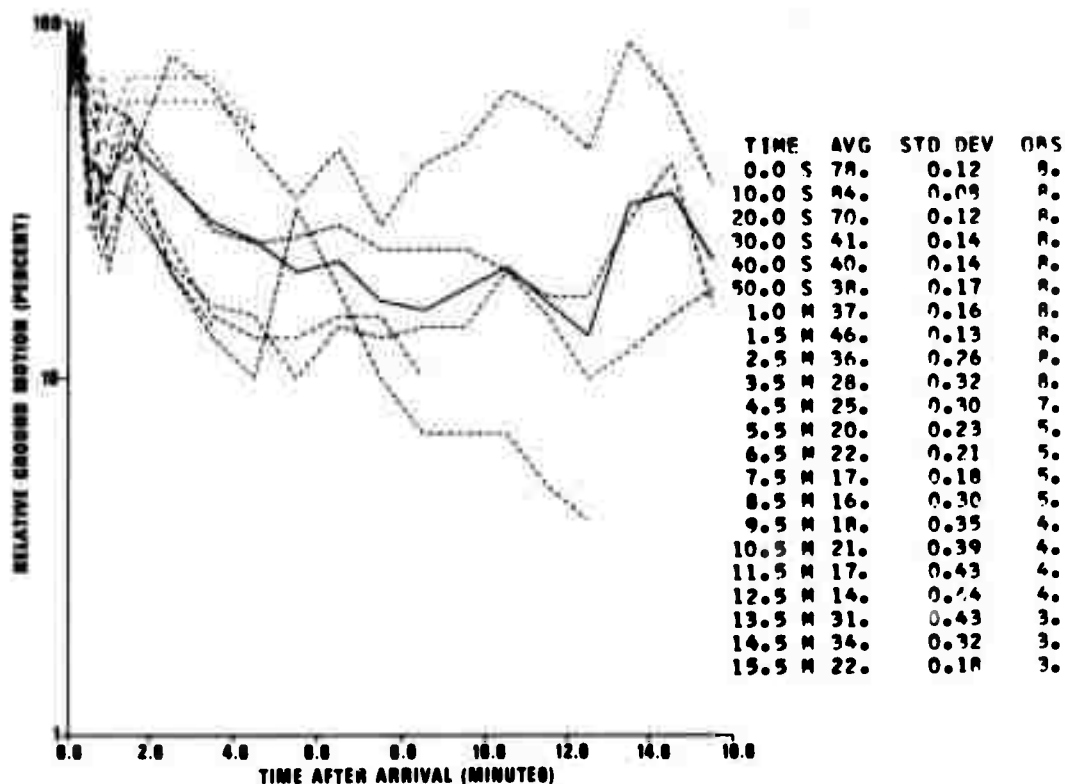


Figure 43. P coda characteristics, Central America, WES.

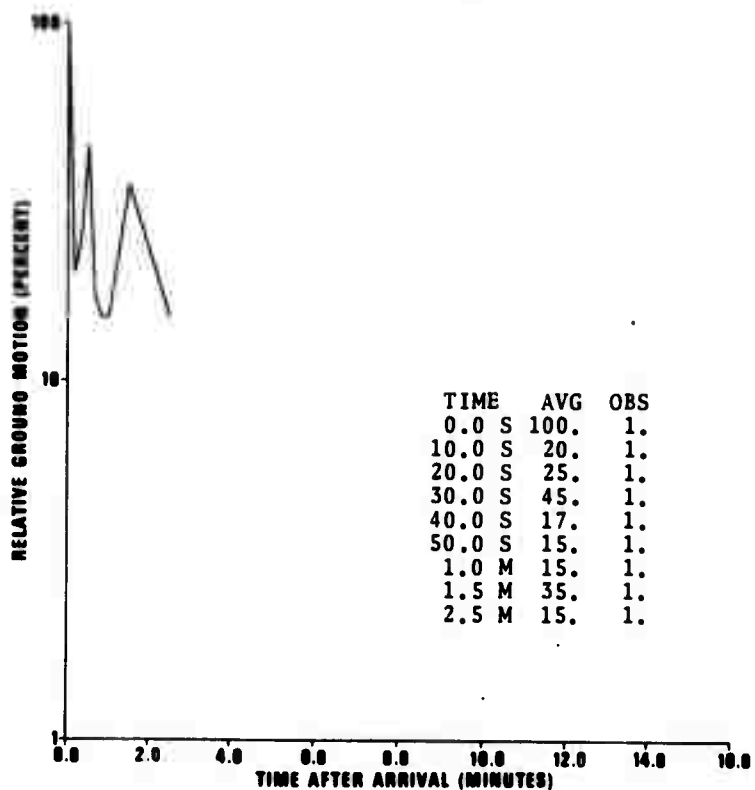


Figure 44. PKP coda characteristics, California and Western United States, ADE.

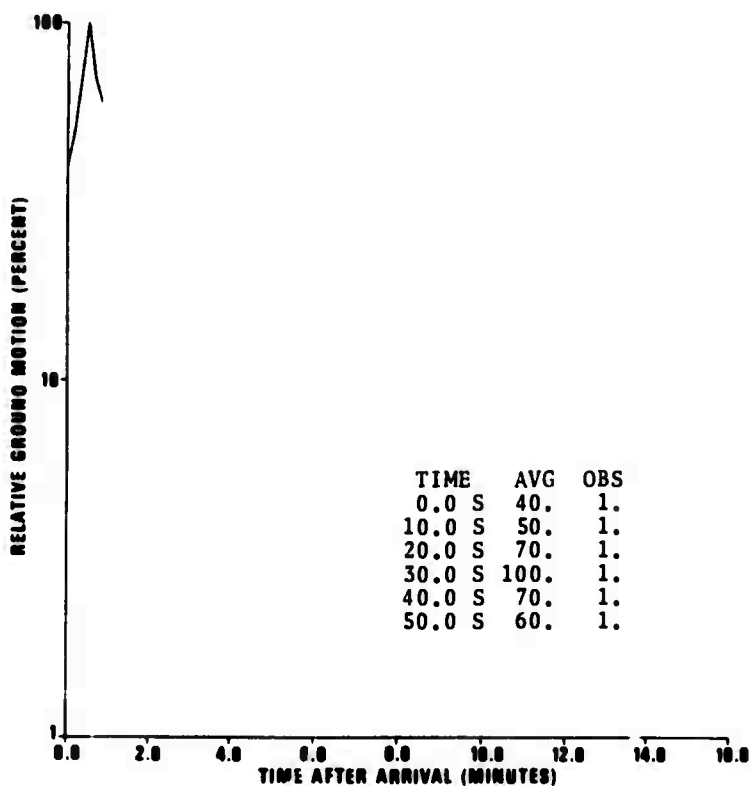


Figure 45. P coda characteristics, California and Western United States, AQU.

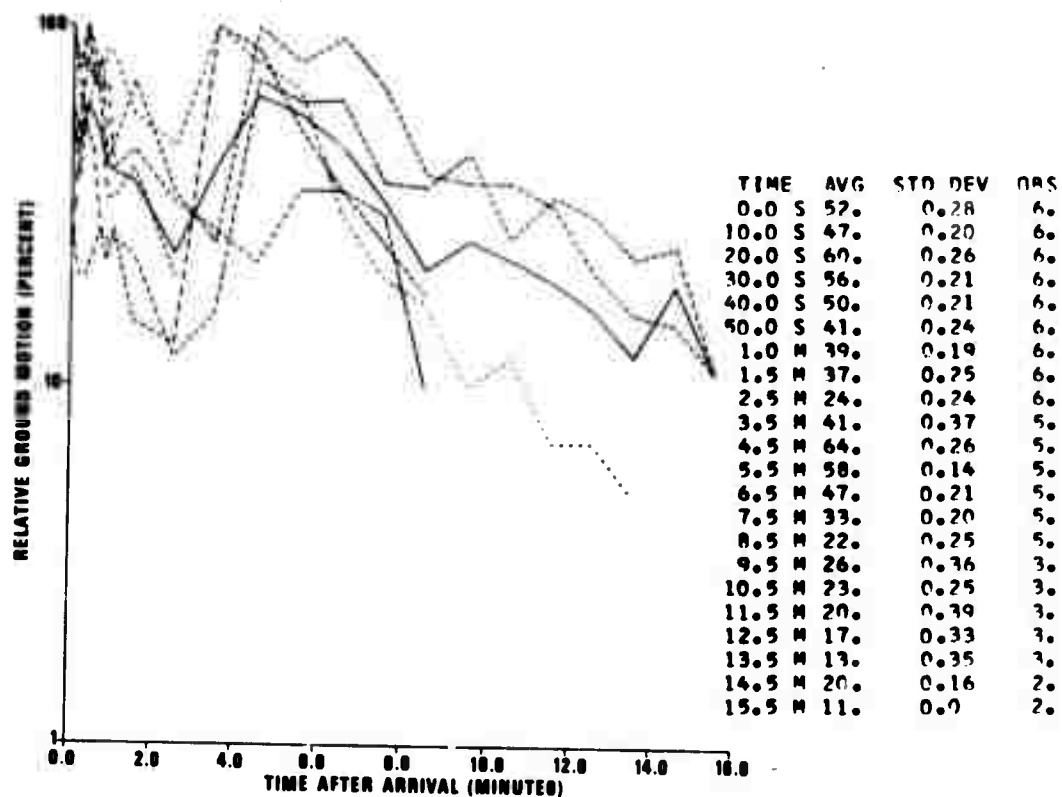


Figure 46. P coda characteristics, California and Western United States, BOZ.

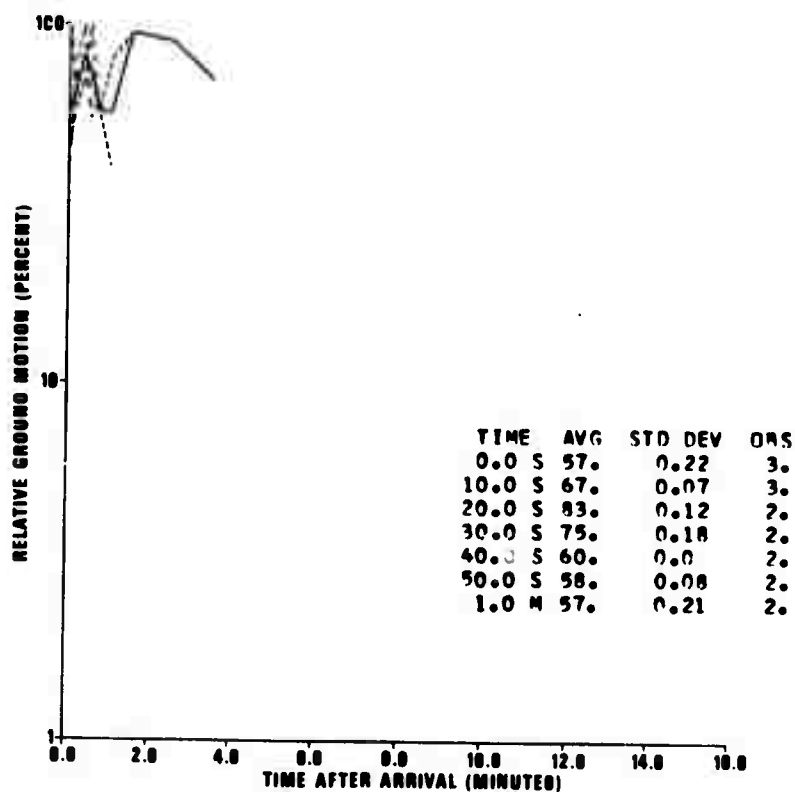


Figure 47. PKP coda characteristics, California and Western United States, CHG.

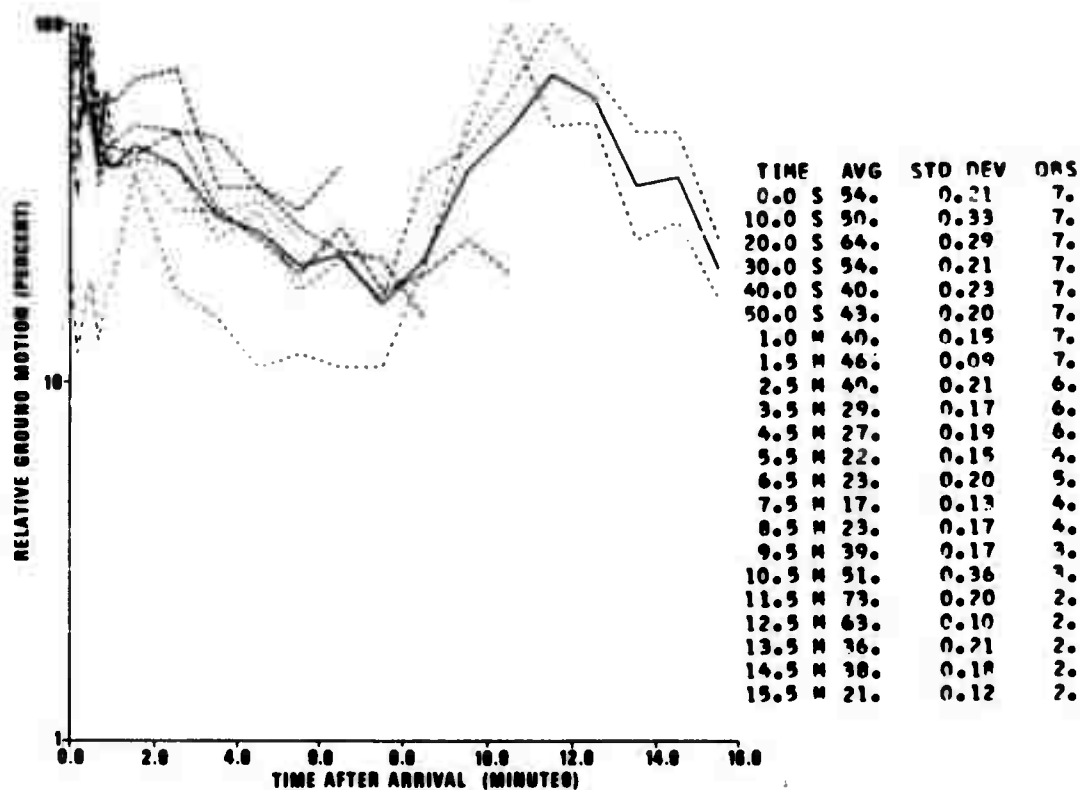


Figure 48. P coda characteristics, California and Western United States, CMC.

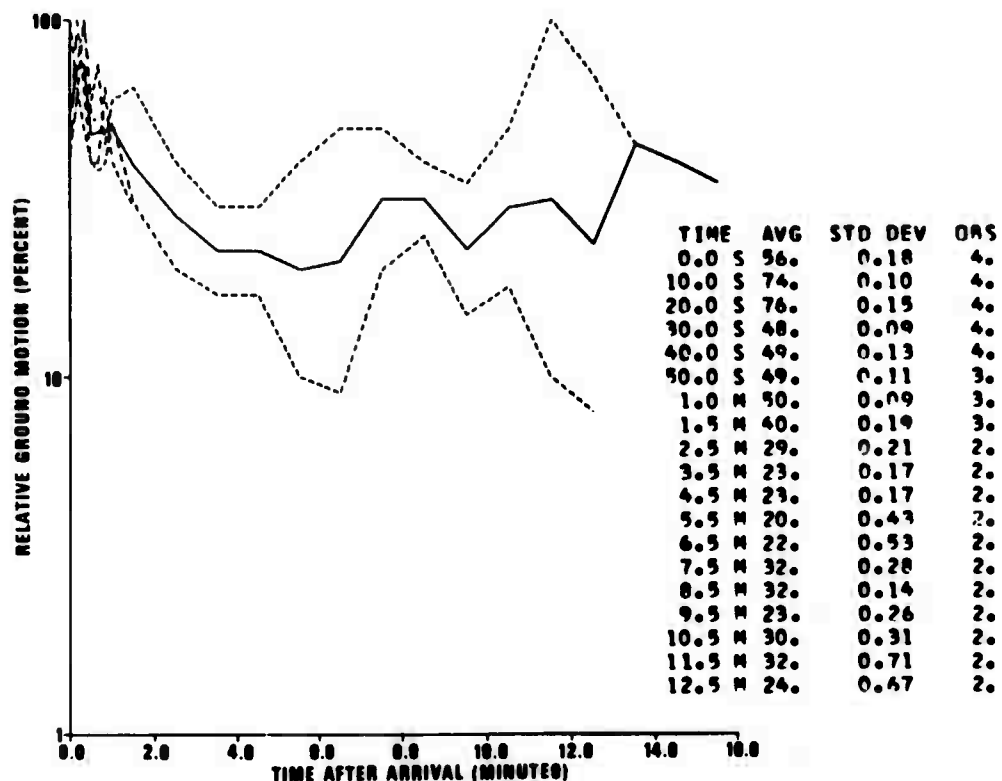


Figure 49. P coda characteristics, California and Western United States, DAL.

Figure 50. No observations, California and Western United States, DAV.

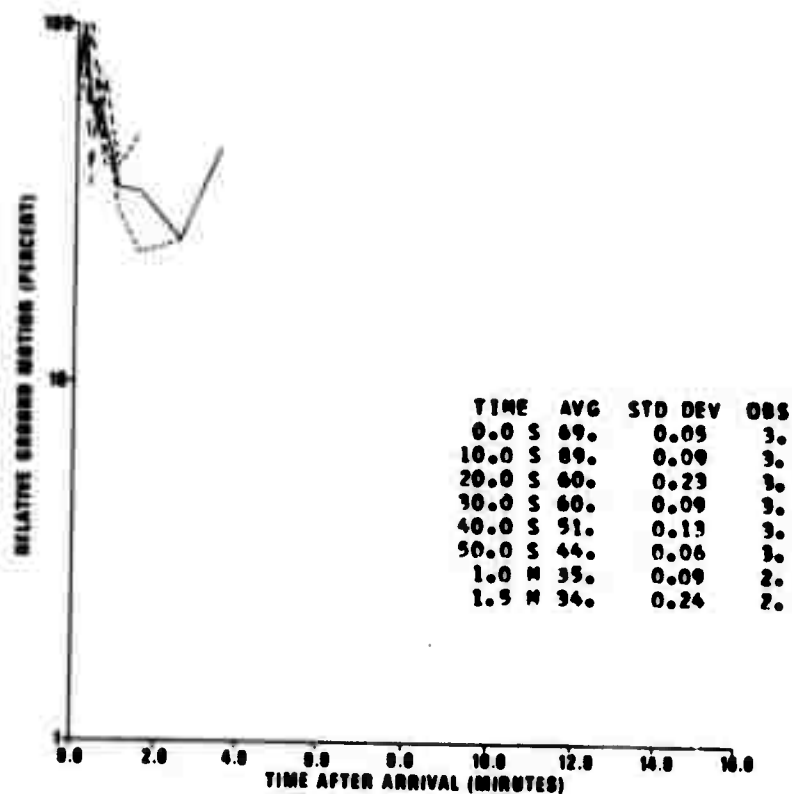


Figure 51. P coda characteristics, California and Western United States, IST.

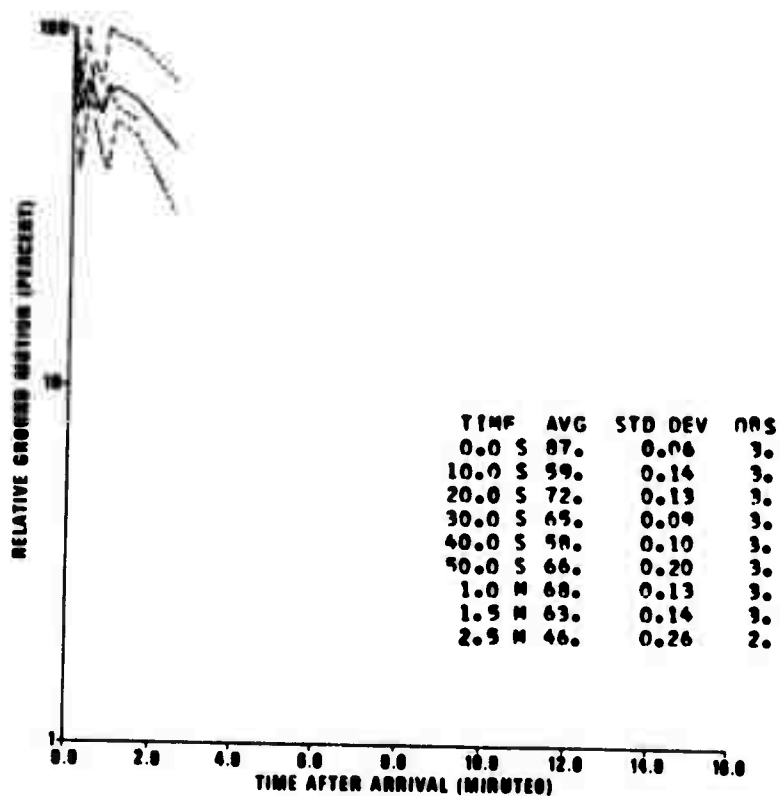


Figure 52. PKP coda characteristics, California and Western United States, KBL.

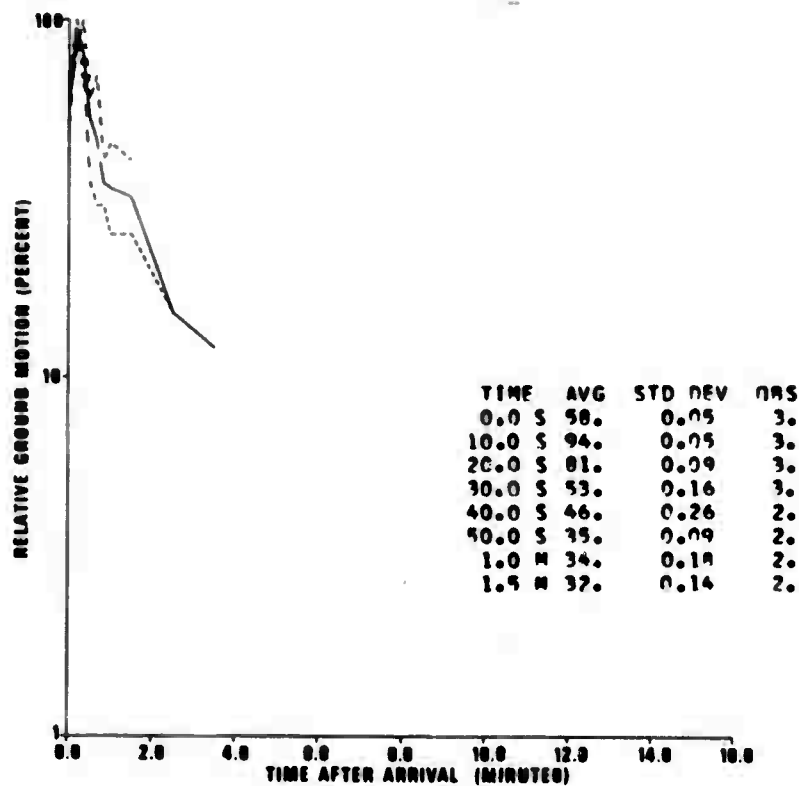


Figure 53. P coda characteristics, California and Western United States, KON.

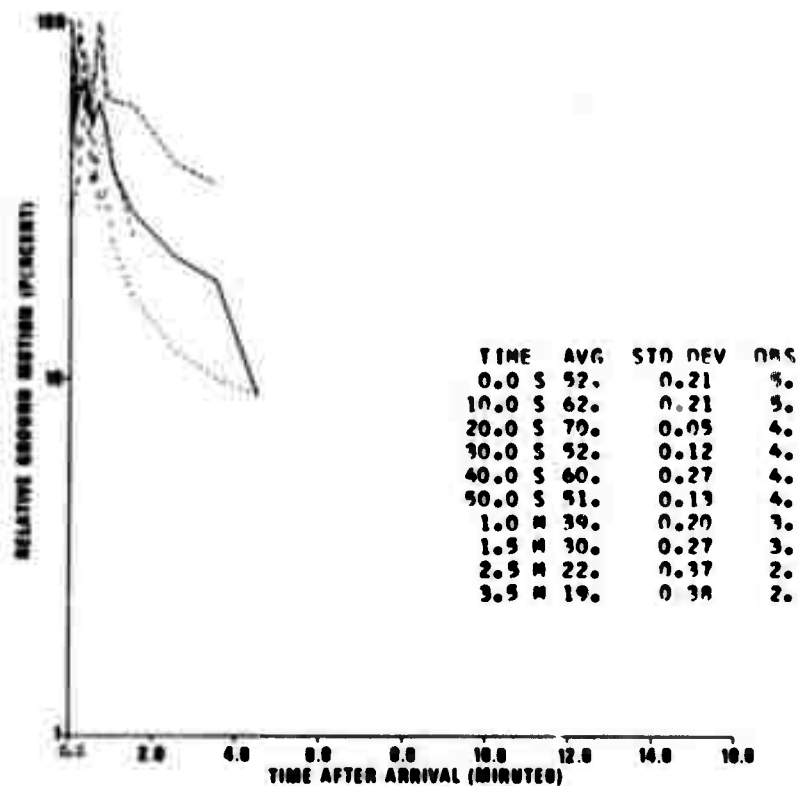


Figure 54. P coda characteristics, California and Western United States, MAL.

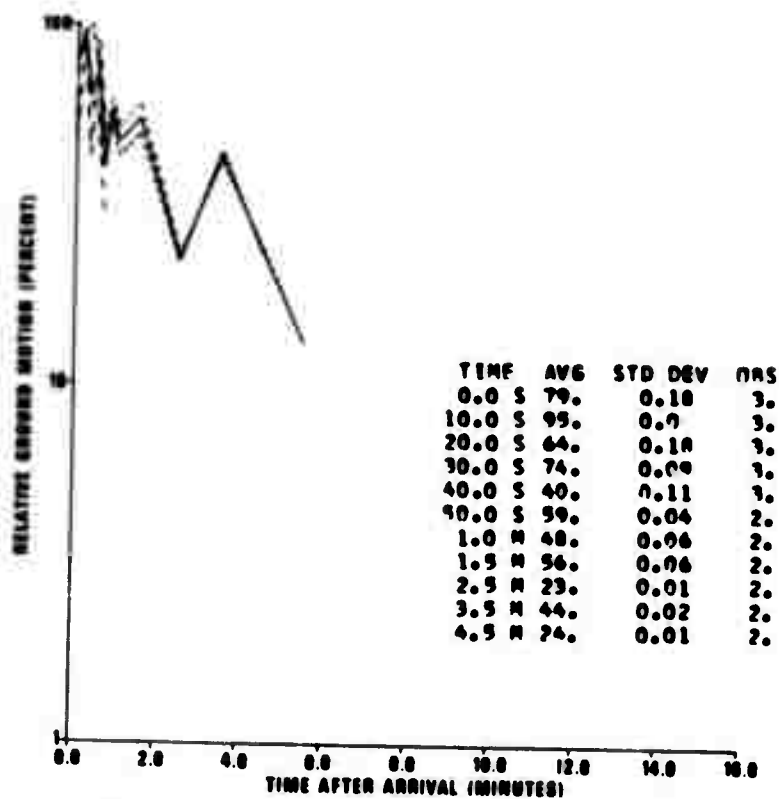


Figure 55. P coda characteristics, California and Western United States, MAT.

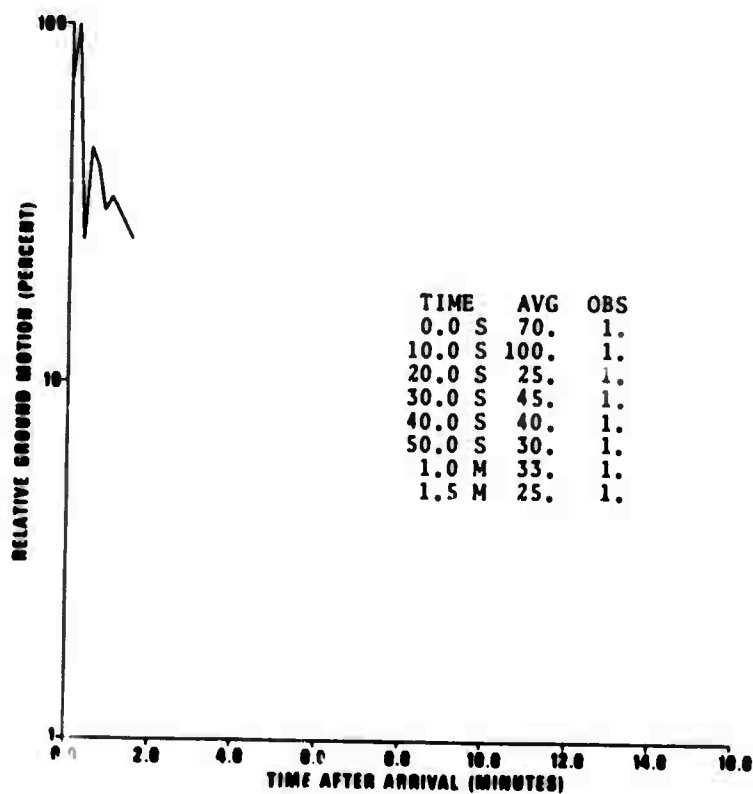


Figure 56. PKP coda characteristics, California and Western United States, MUN.

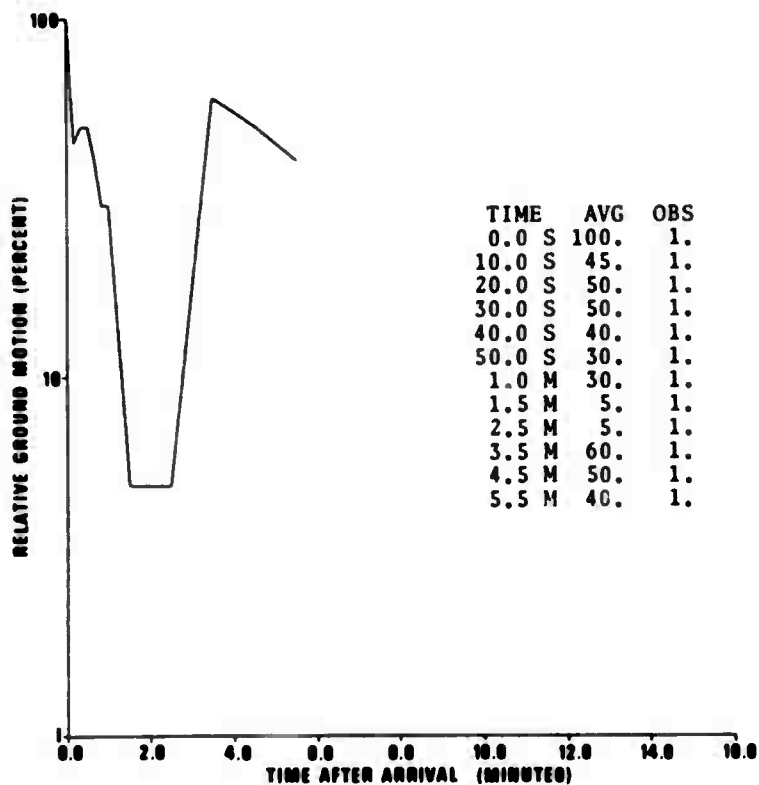


Figure 57. P coda characteristics, California and Western United States, NDI.

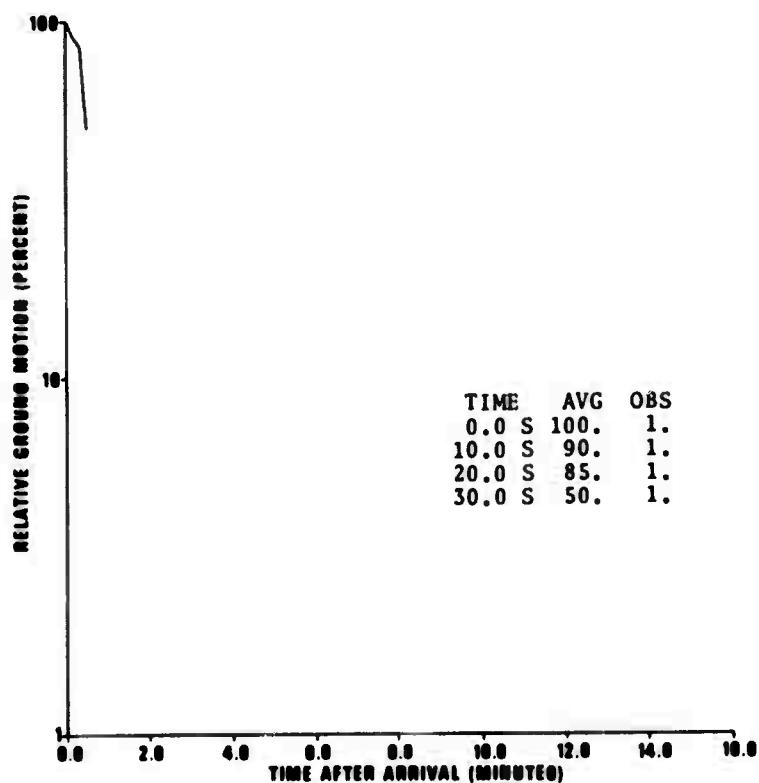


Figure 58. PKP coda characteristics, California and Western United States, NDI.

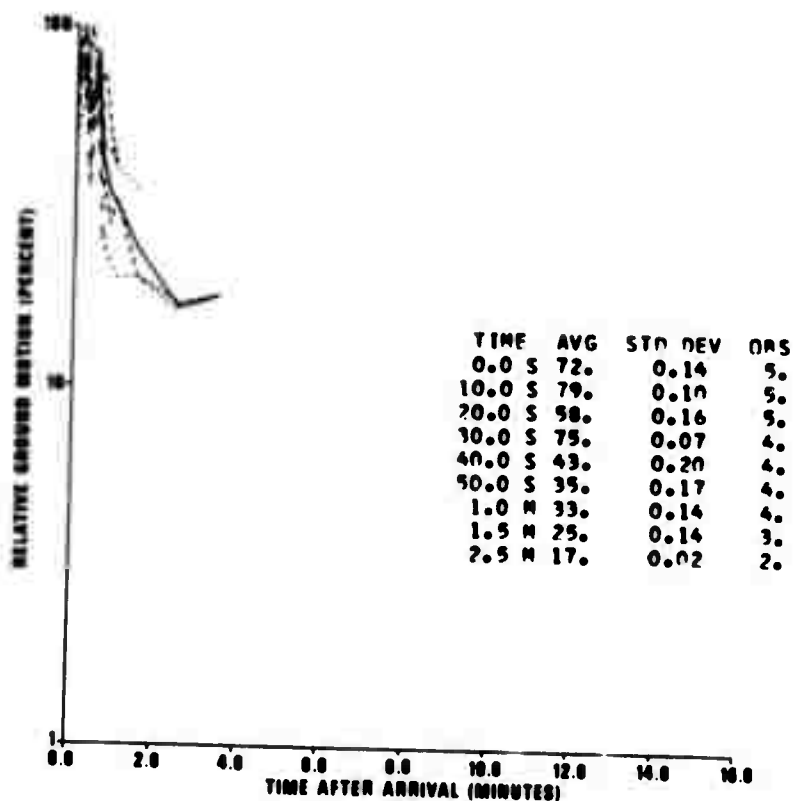


Figure 59. P coda characteristics, California and Western United States, SEO.

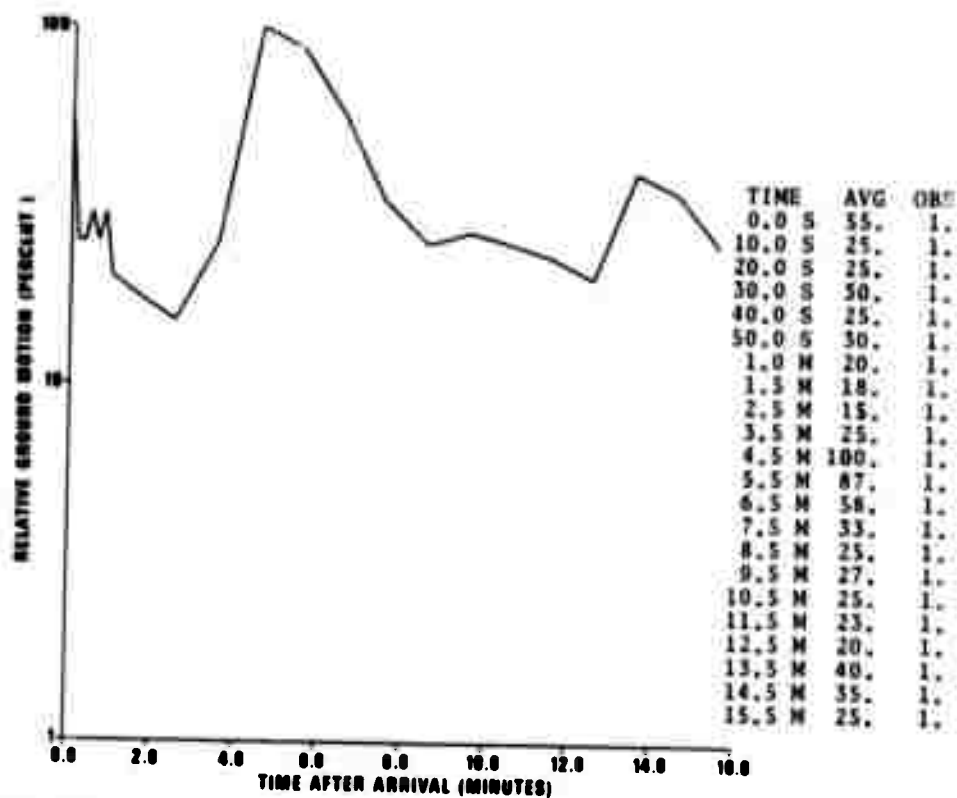


Figure 60. P coda characteristics, California and Western United States, SHI.

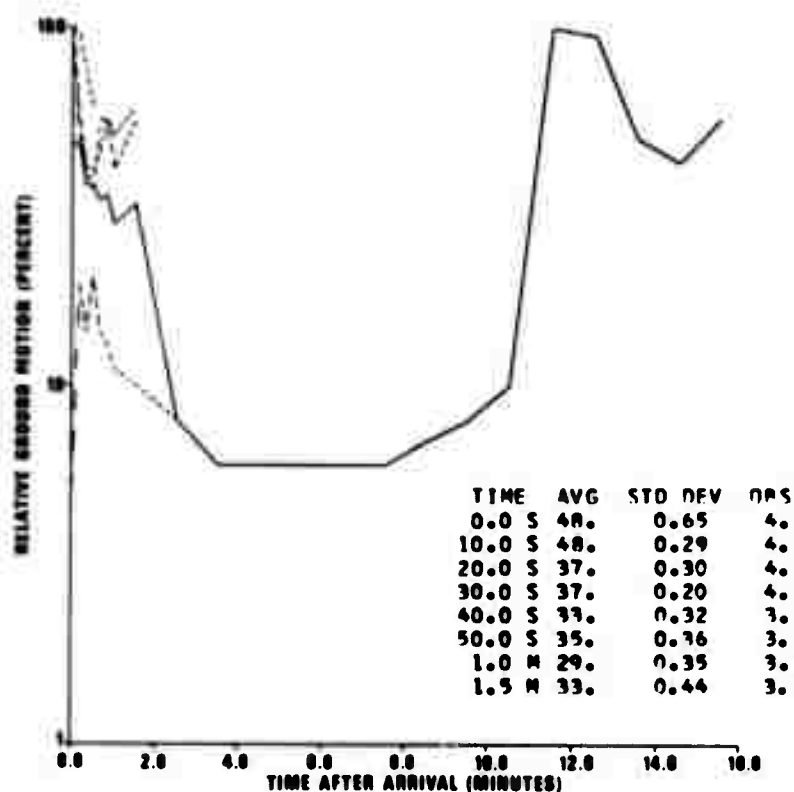


Figure 61. P coda characteristics, California and Western United States, WES.

Figure 62. No observations, Alaska, ADE.

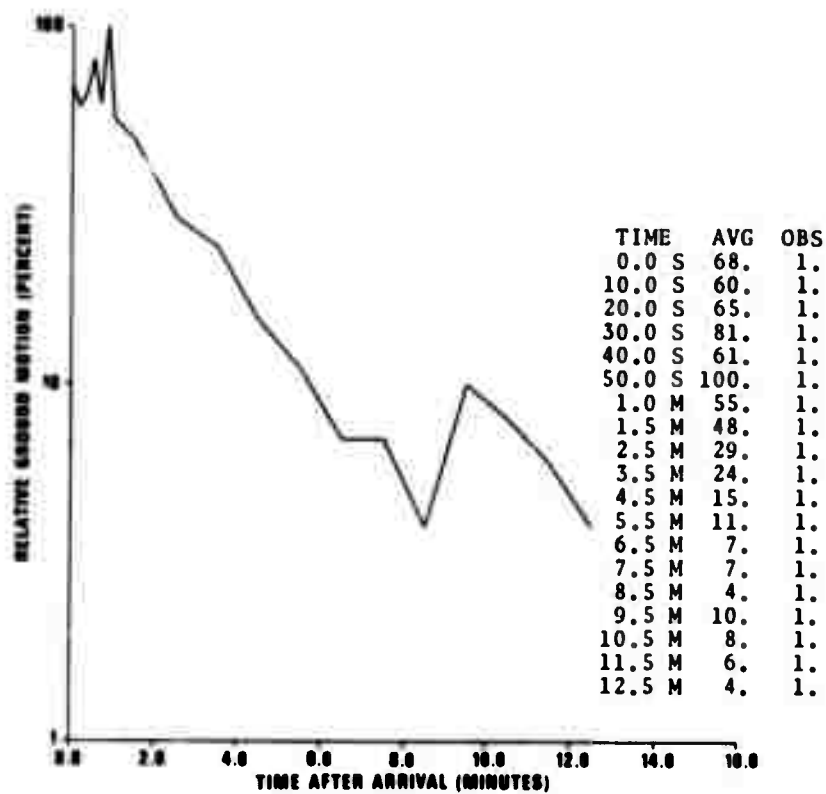


Figure 63. P coda characteristics, Alaska, AQU.

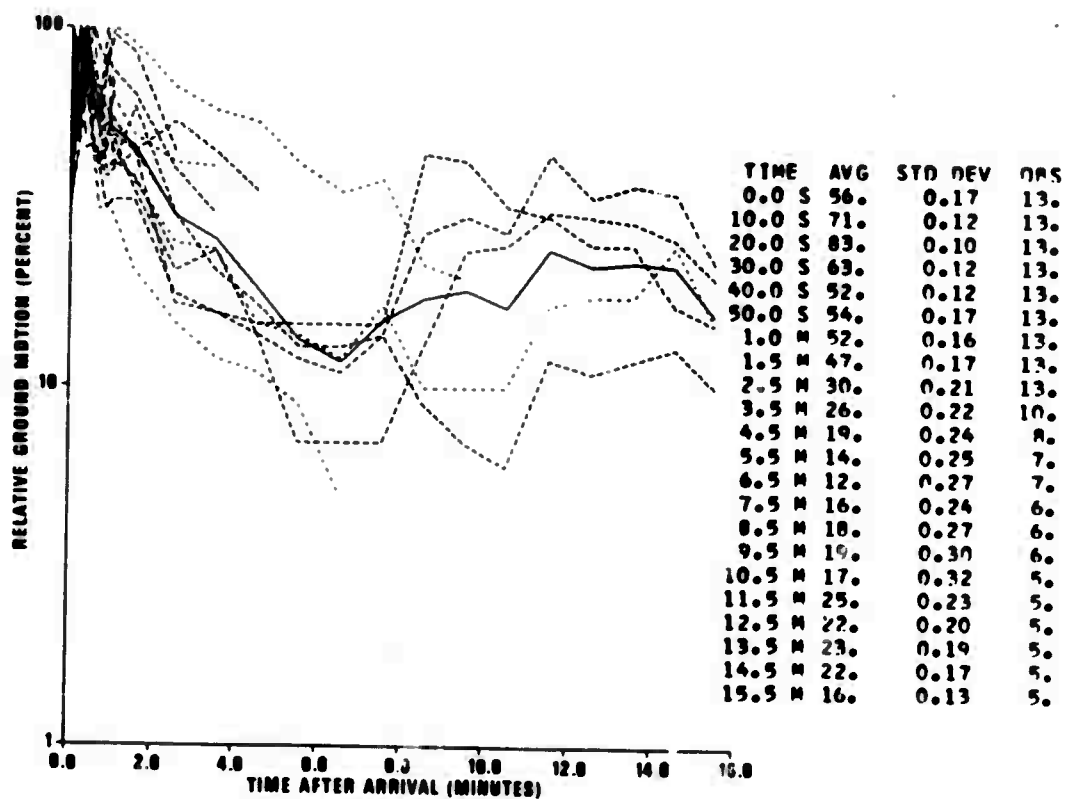


Figure 64. P coda characteristics, Alaska, BOZ.

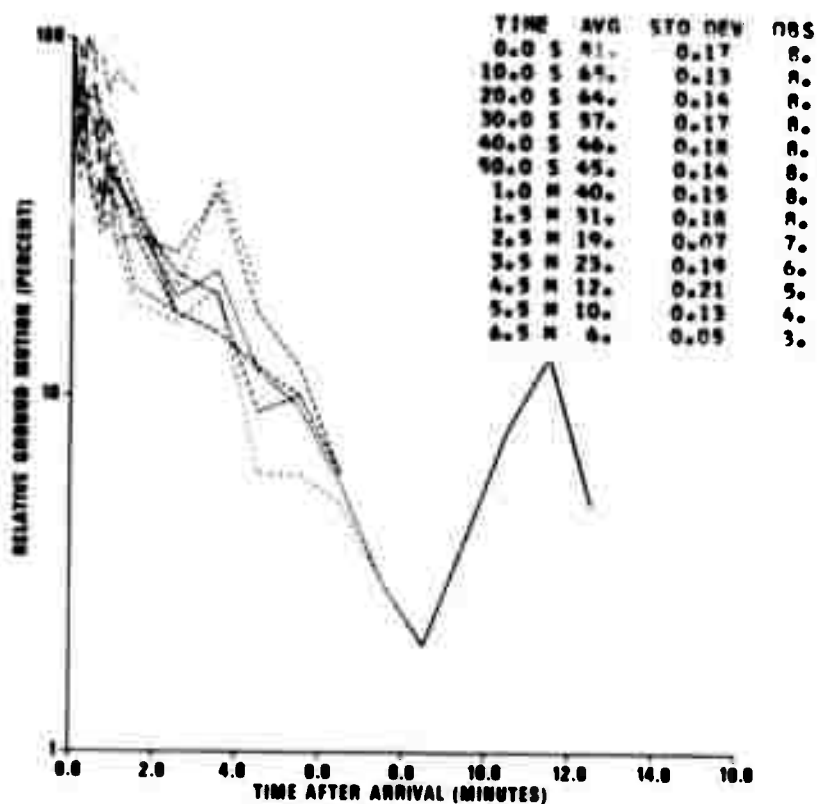


Figure 65. P coda characteristics, Alaska, CHG.

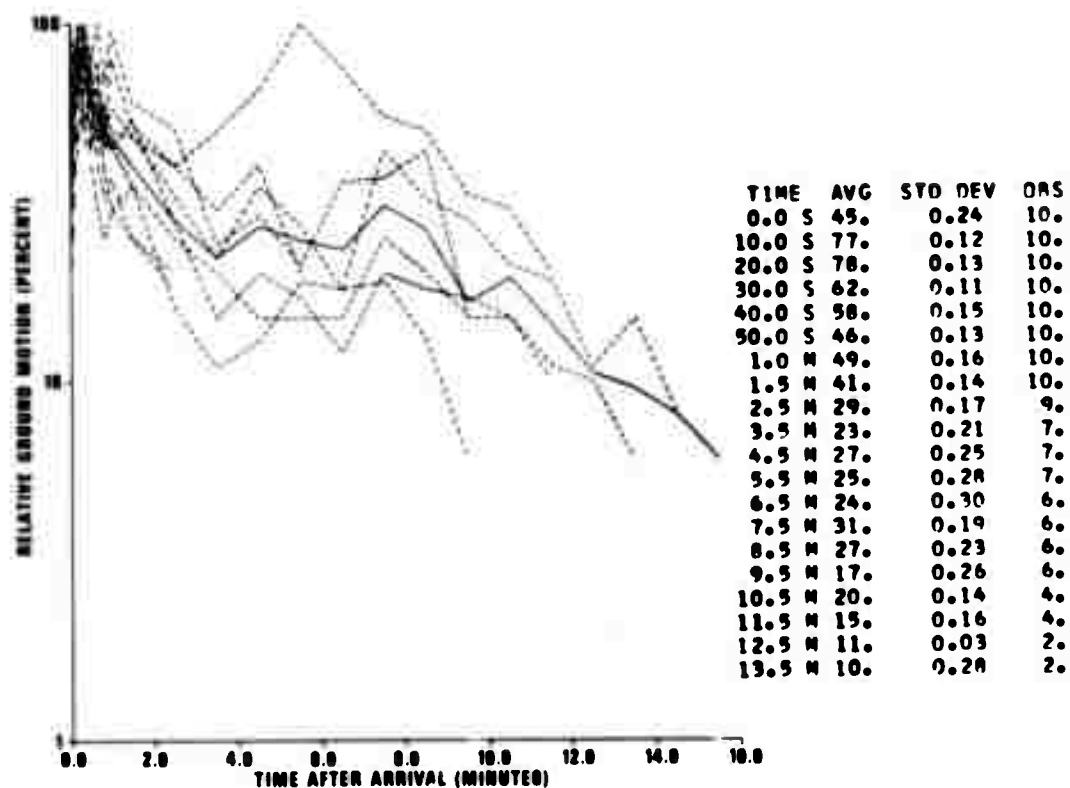


Figure 66. P coda characteristics, Alaska, CMC.

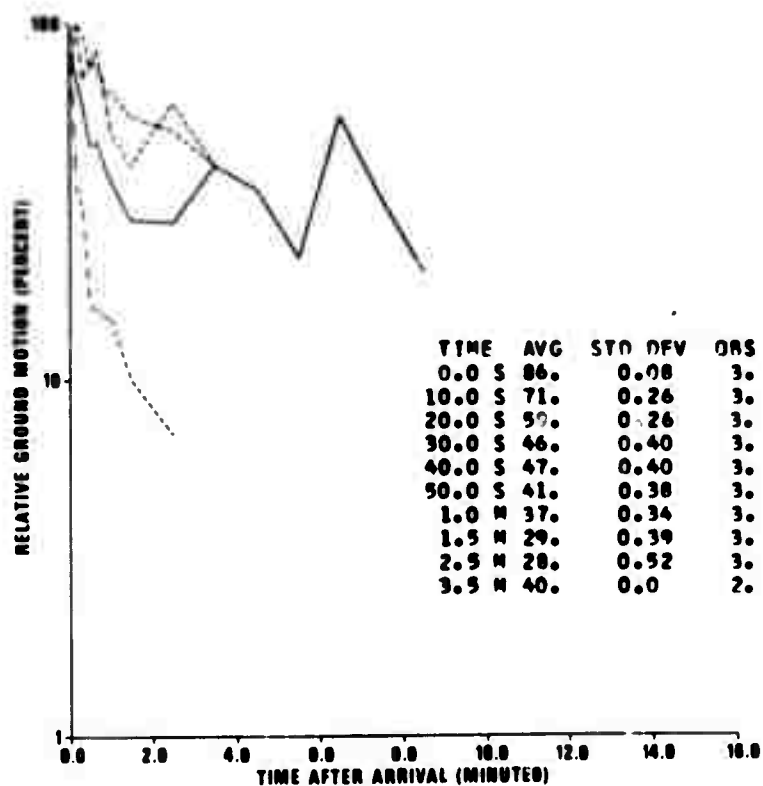


Figure 67. P coda characteristics, Alaska, DAL.

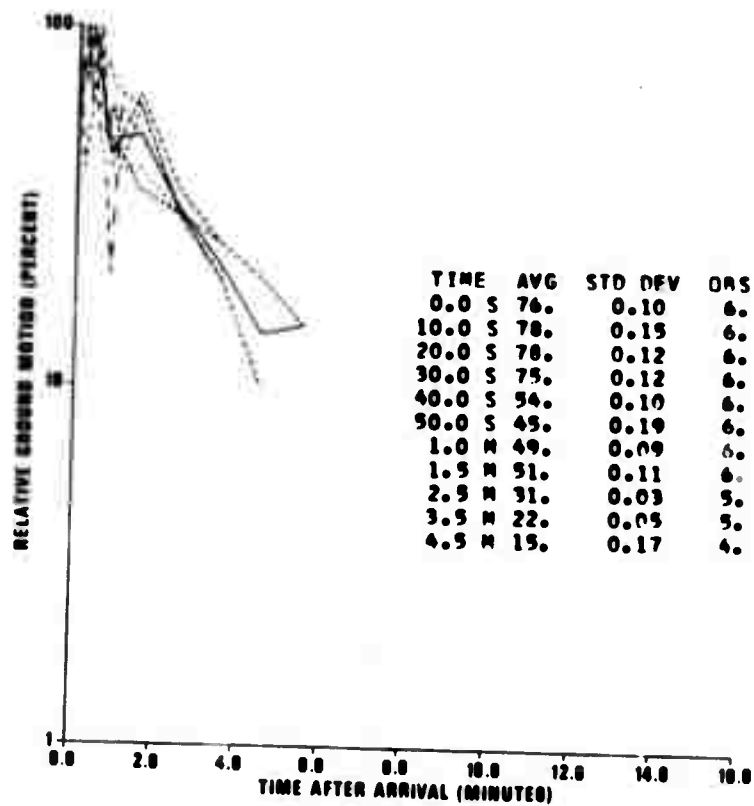


Figure 68. P coda characteristics, Alaska, DAV.

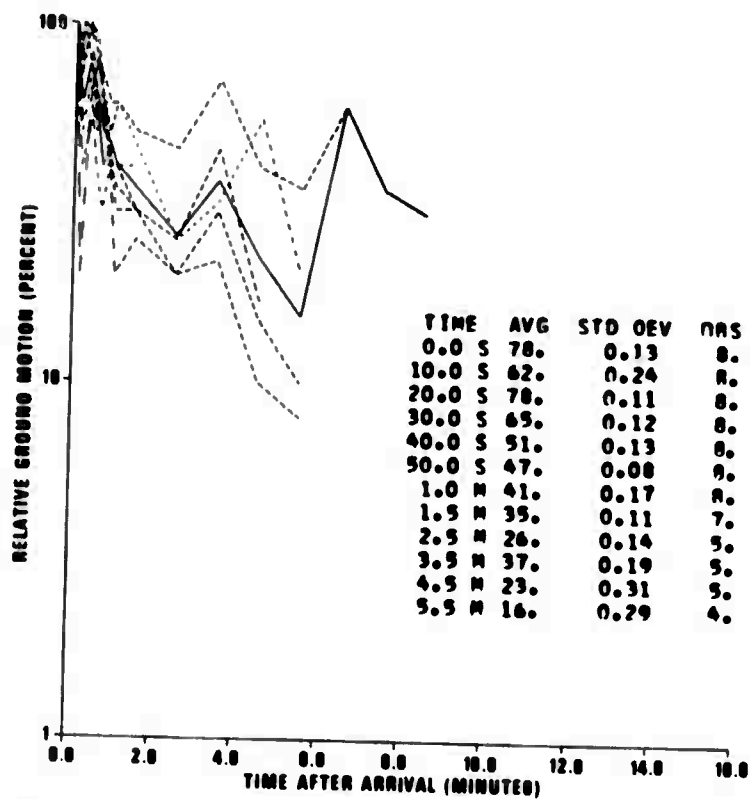


Figure 69. P coda characteristics, Alaska, IST.

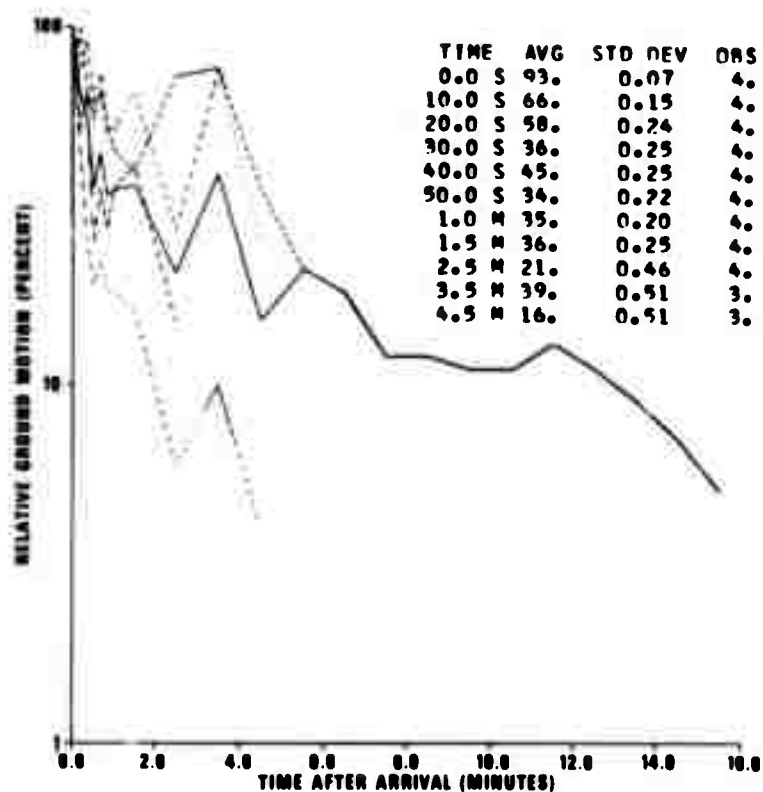


Figure 70. P. coda characteristics, Alaska, KBL.

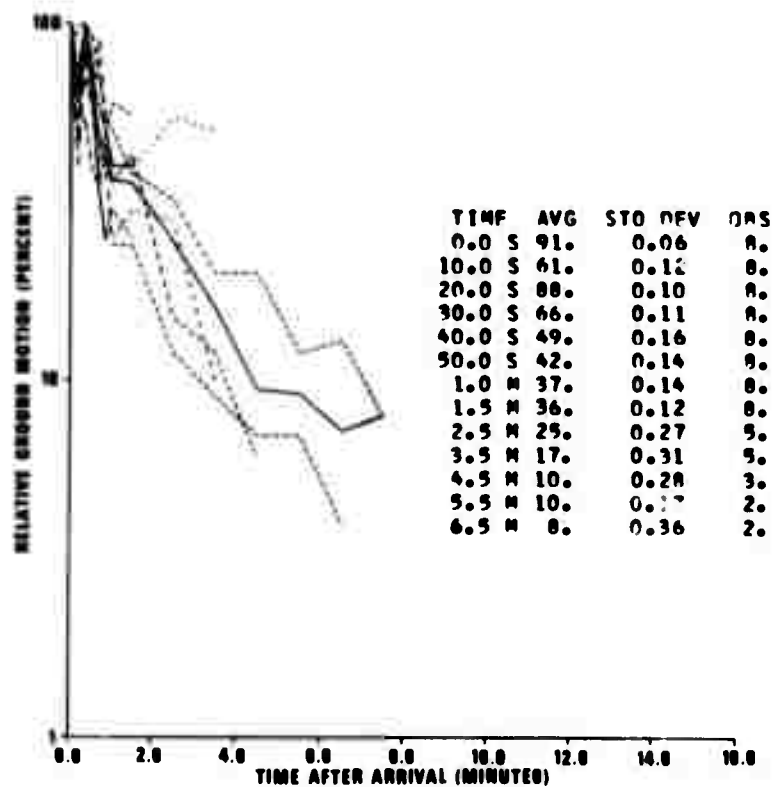


Figure 71. P. coda characteristics, Alaska, KON.

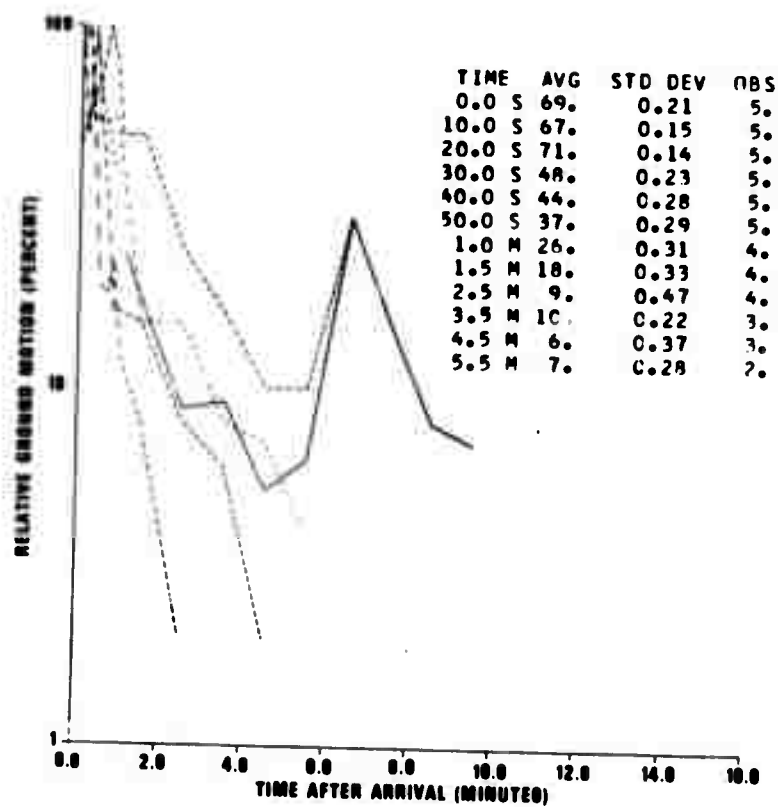


Figure 72. P coda characteristics, Alaska, MAL.

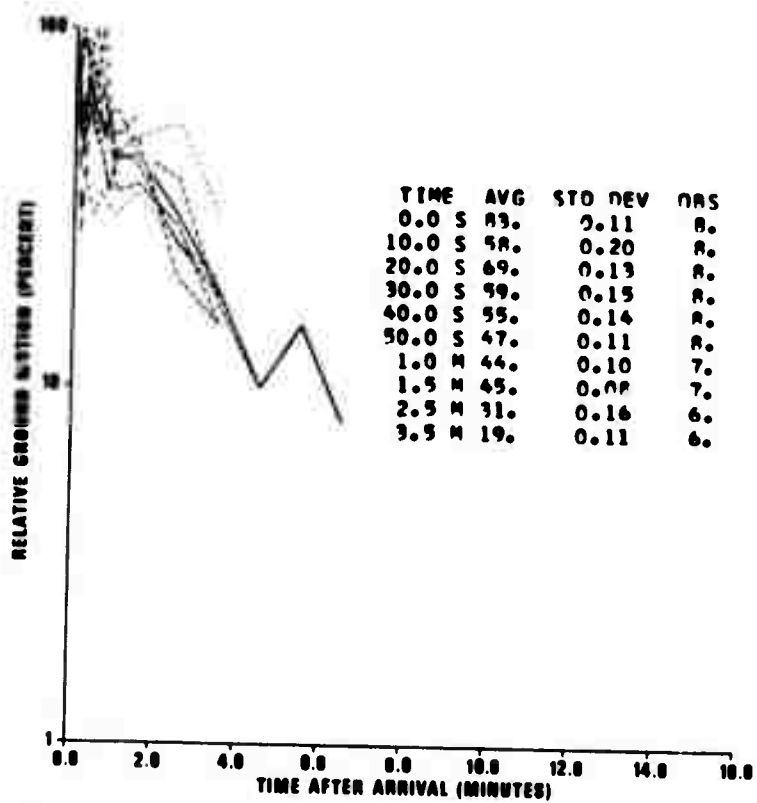


Figure 73. P coda characteristics, Alaska, MAT.

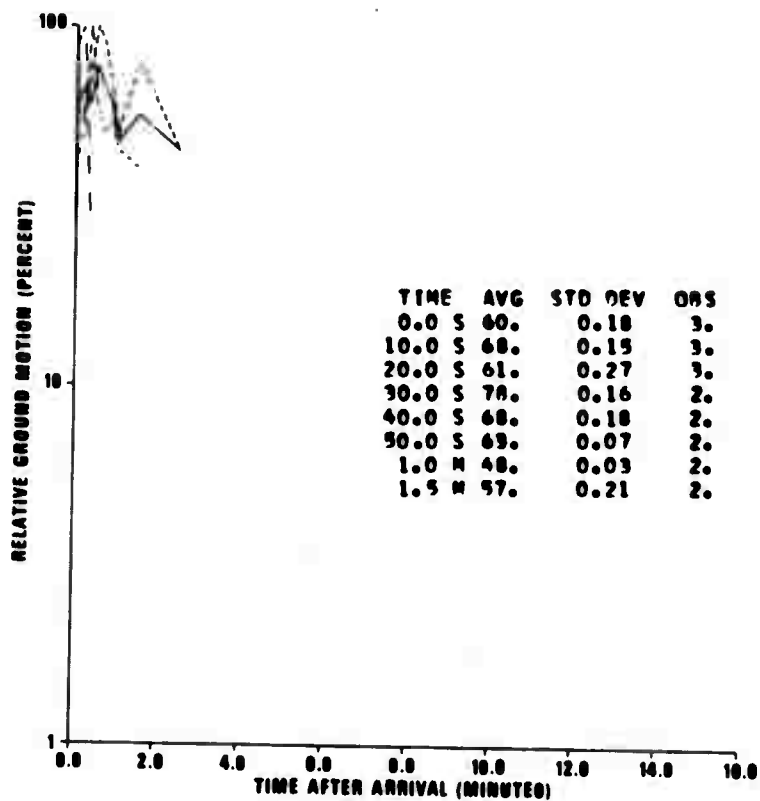


Figure 74. PKP coda characteristics, Alaska, MUN.

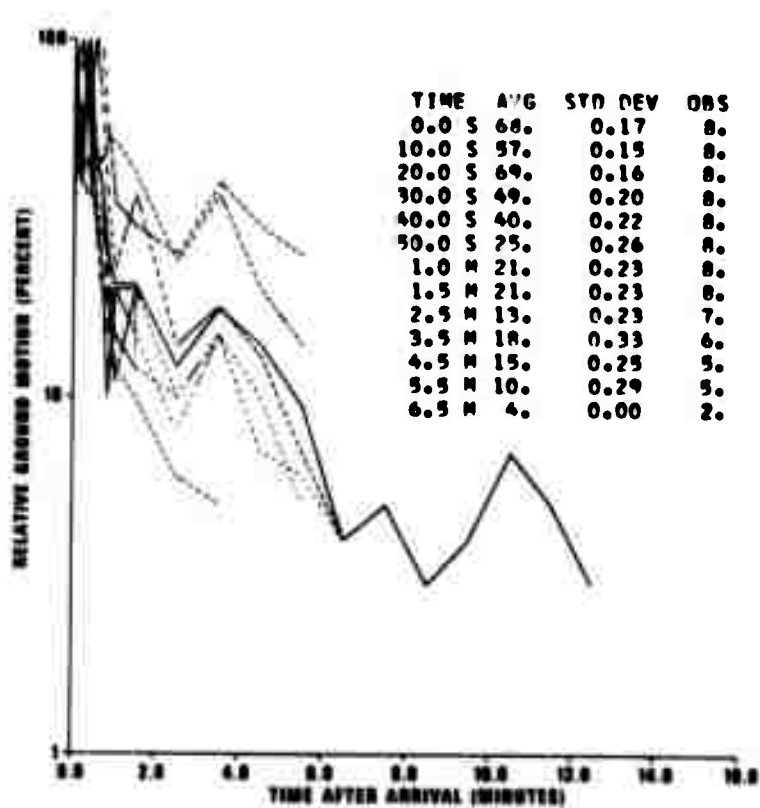


Figure 75. P coda characteristics, Alaska, NDI.

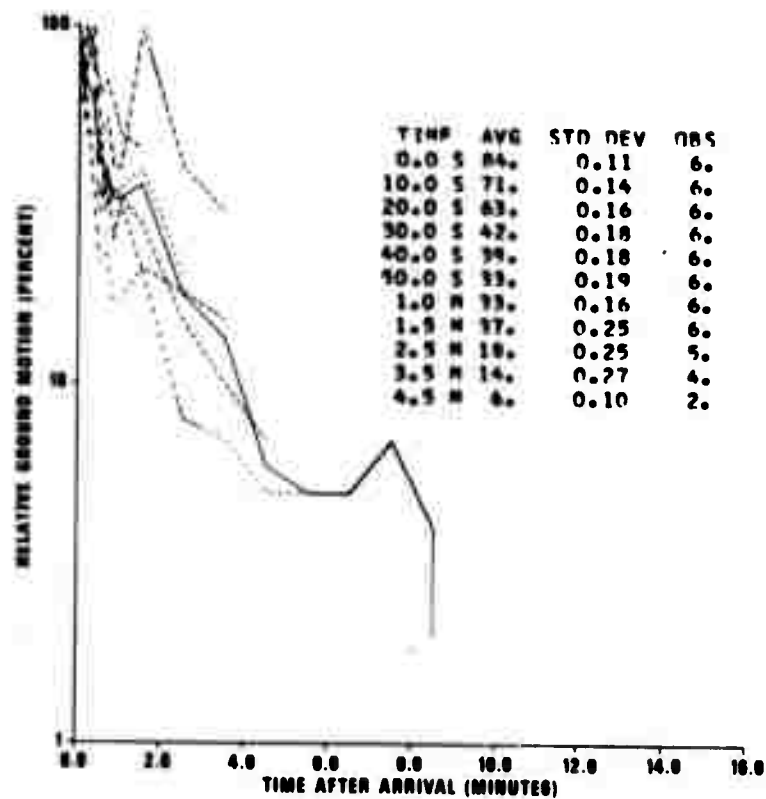


Figure 76. P coda characteristics, Alaska, SEO.

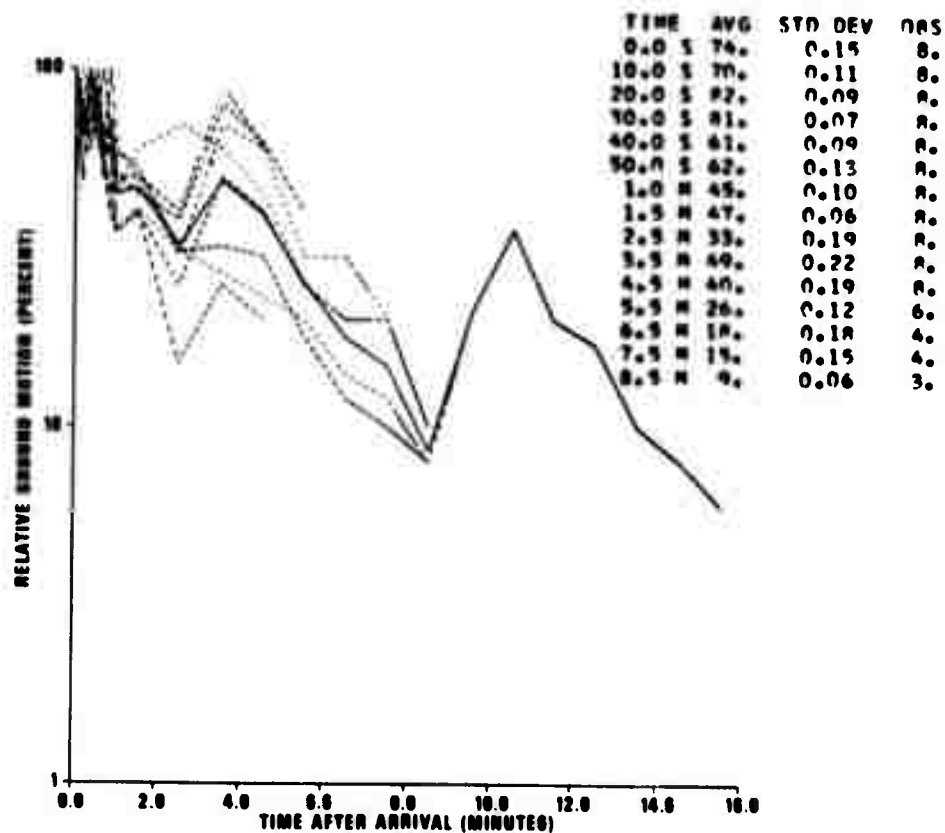


Figure 77. P coda characteristics, Alaska, SHI.

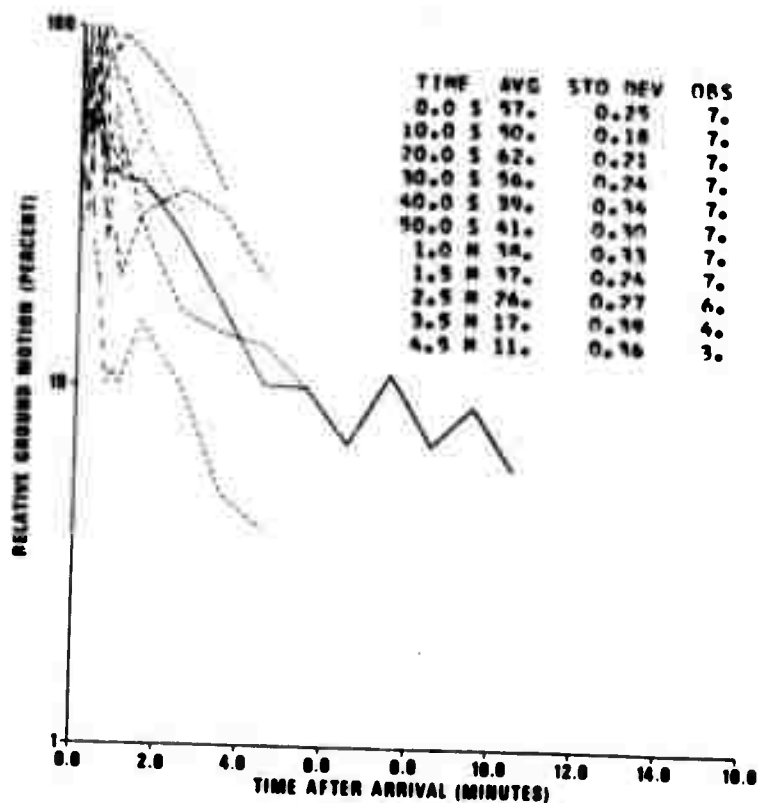


Figure 78. P coda characteristics, Alaska, WES.

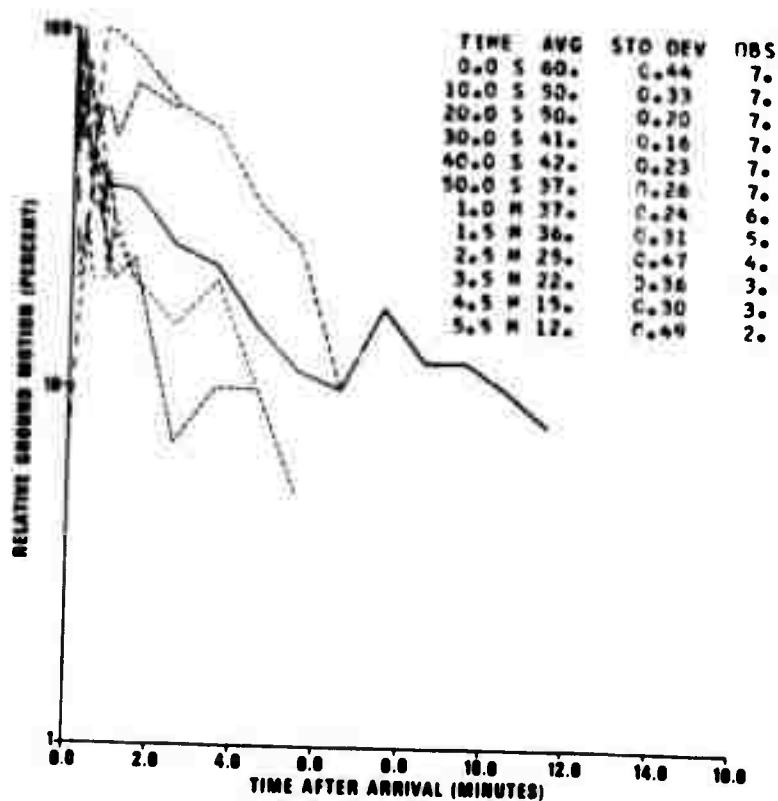


Figure 79. P coda characteristics, Aleutian Islands, ADE.

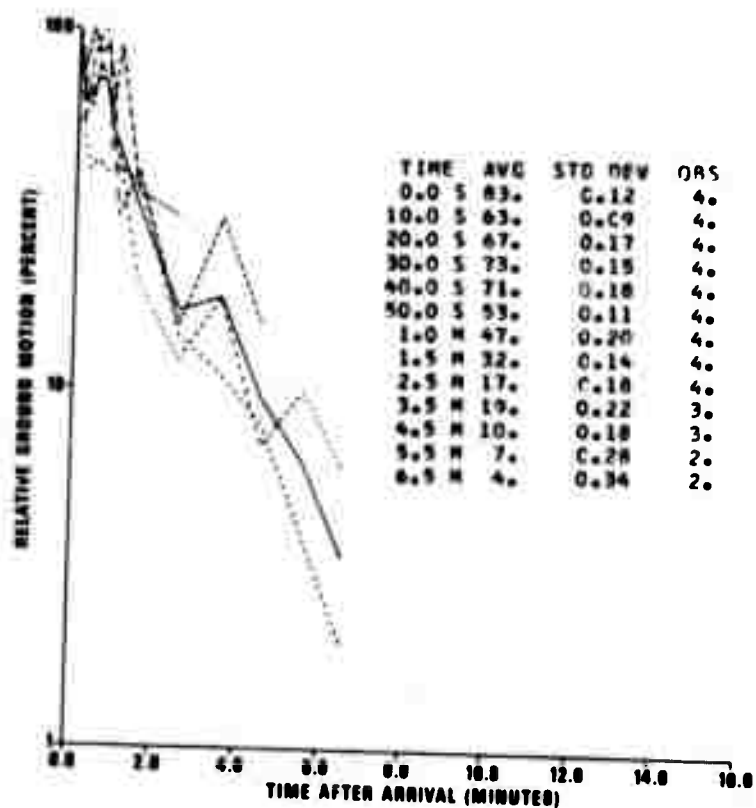


Figure 80. P coda characteristics, Aleutian Islands, AQU.

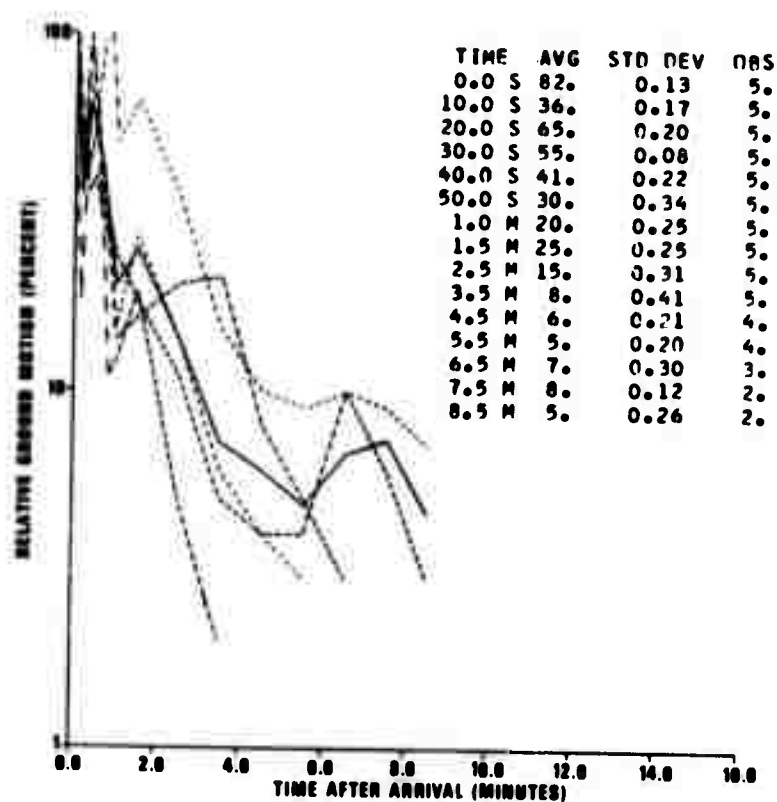


Figure 81. P coda characteristics, Aleutian Islands, BOZ.

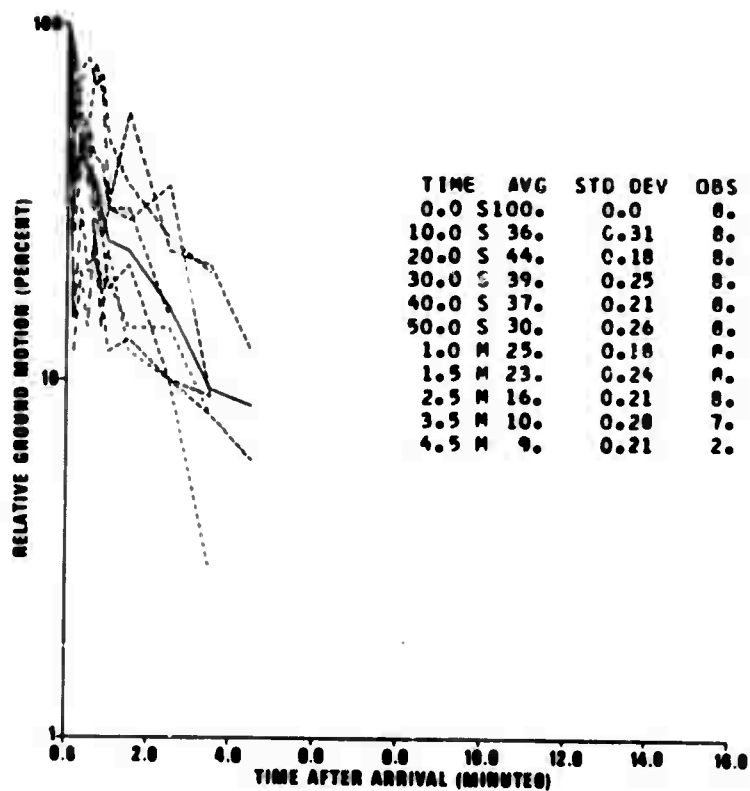


Figure 82. P coda characteristics, Aleutian Islands, CHG.

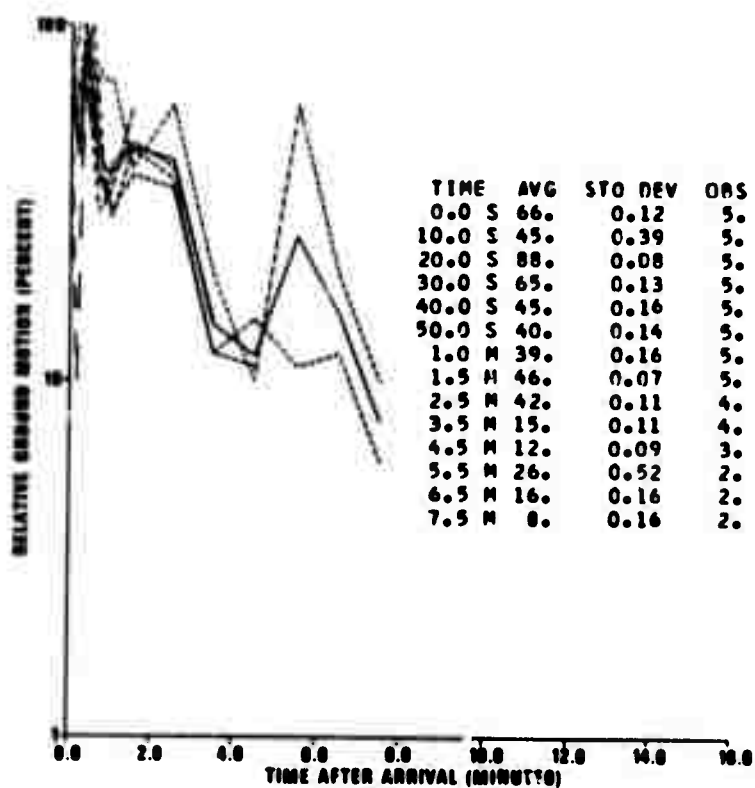


Figure 83. P coda characteristics, Aleutian Islands, CMC.

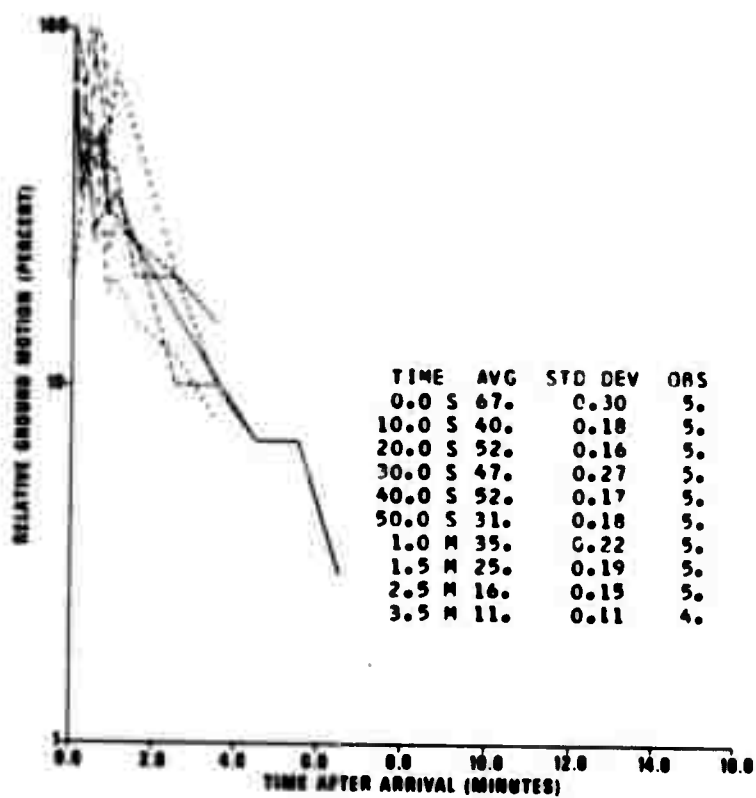


Figure 84. P coda characteristics, Aleutian Islands, DAL.

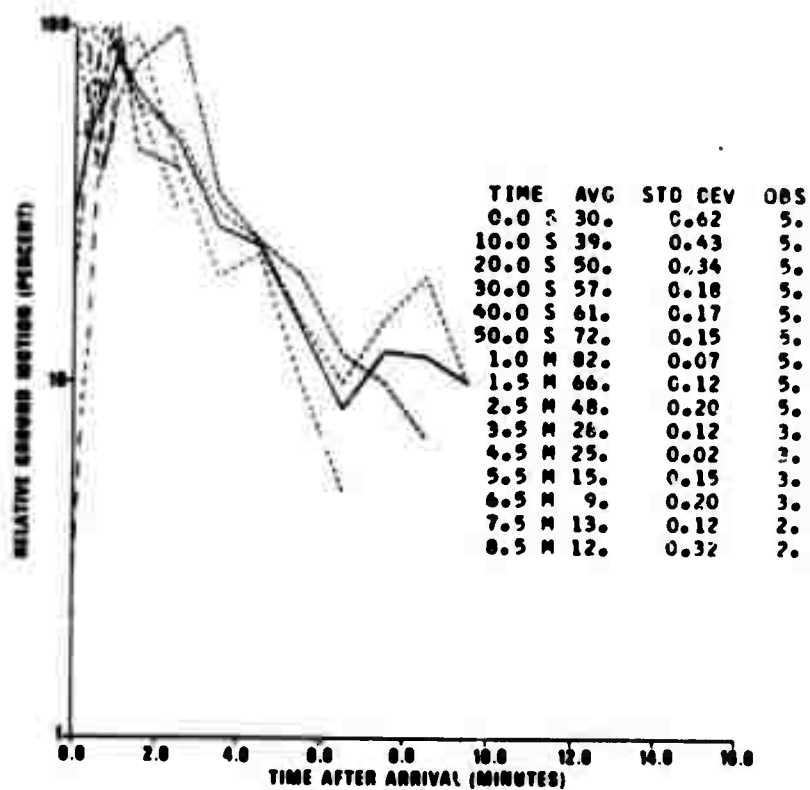


Figure 85. P coda characteristics, Aleutian Islands, DAV.

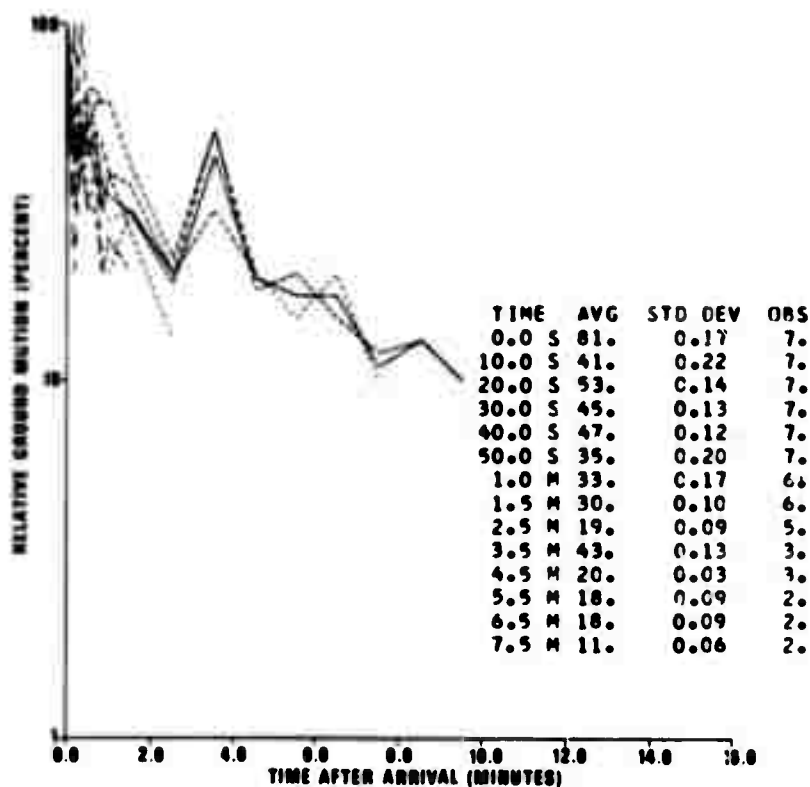


Figure 86. P coda characteristics, Aleutian Islands, IST.

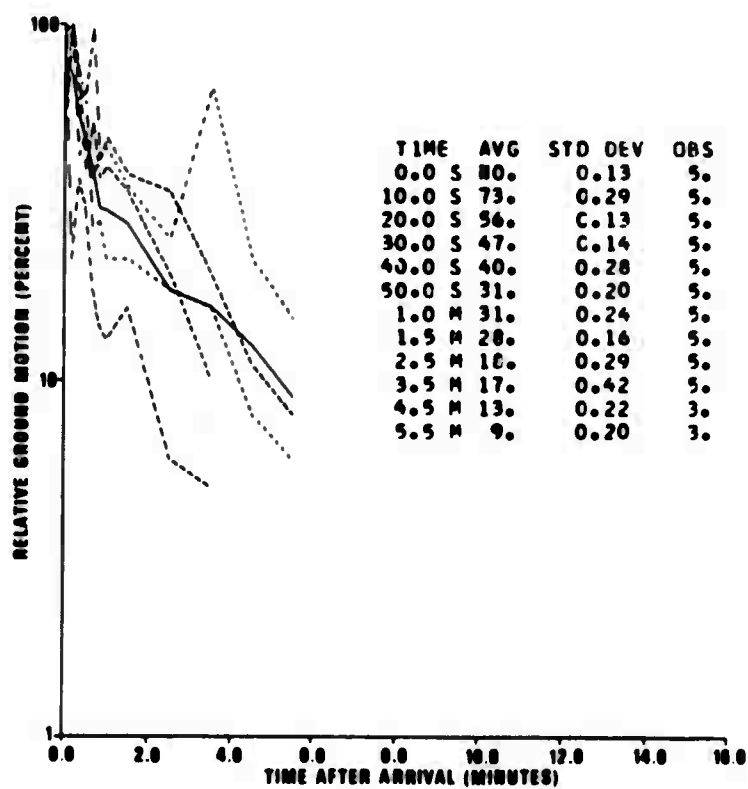


Figure 87. P coda characteristics, Aleutian Islands, KBL.

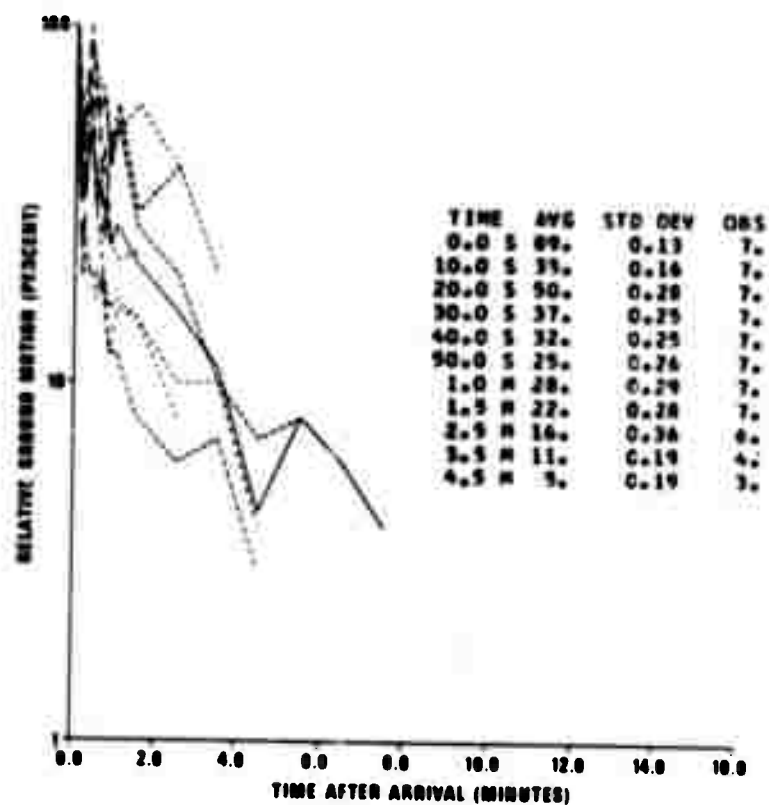


Figure 88. P coda characteristics, Aleutian Islands, KON.

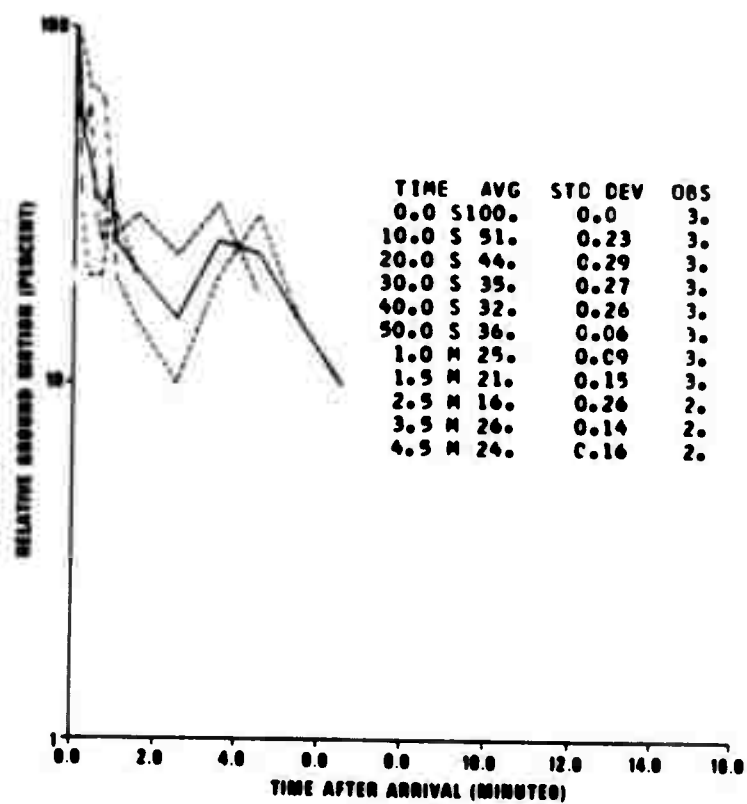


Figure 89. P coda characteristics, Aleutian Islands, MAL.

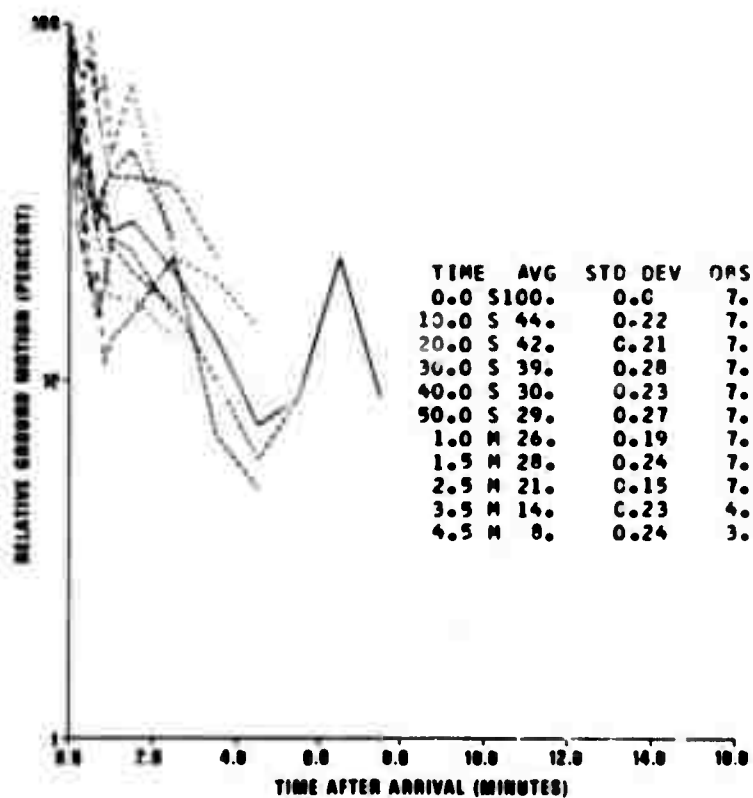


Figure 90. P coda characteristics, Aleutian Islands, MAT.

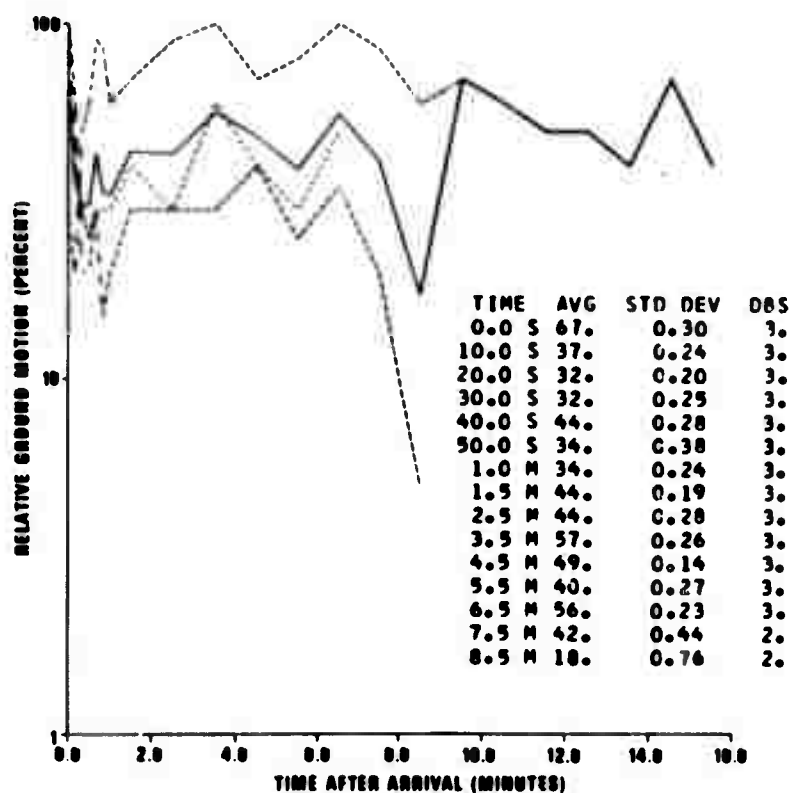


Figure 91. P coda characteristics, Aleutian Islands, MUN.

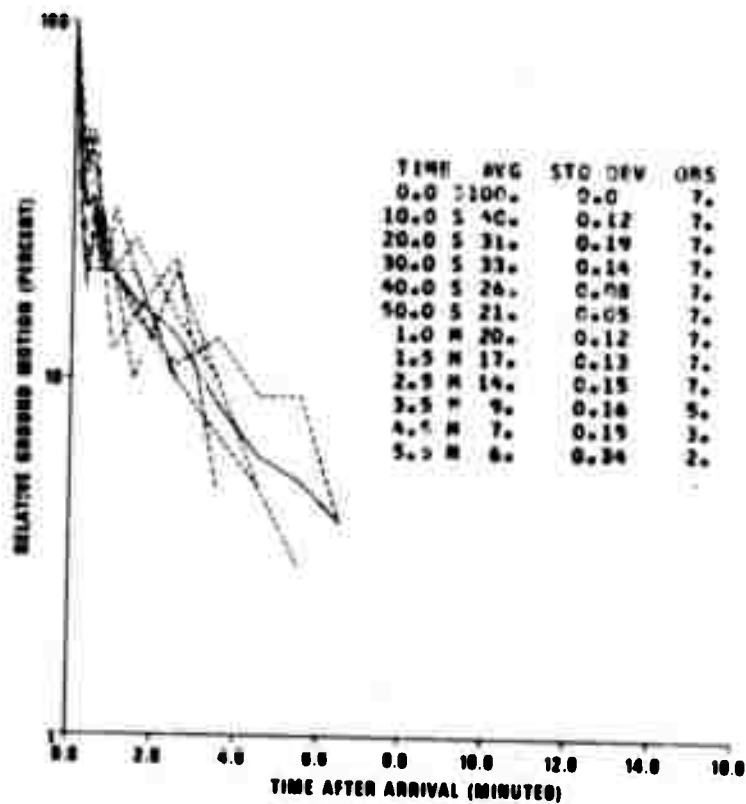


Figure 92. P coda characteristics, Aleutian Islands, NDI.

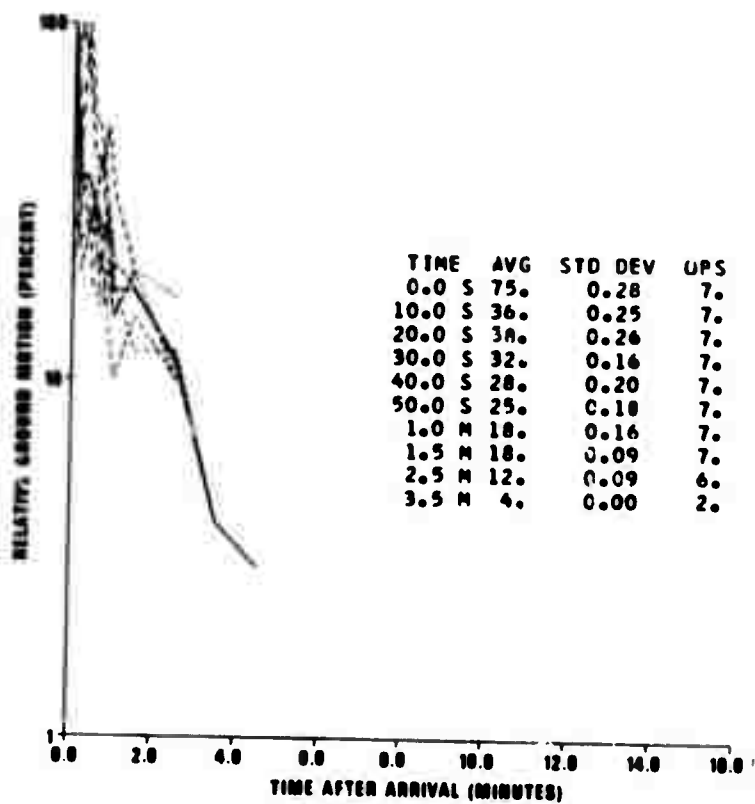


Figure 93. P coda characteristics, Aleutian Islands, SEO.

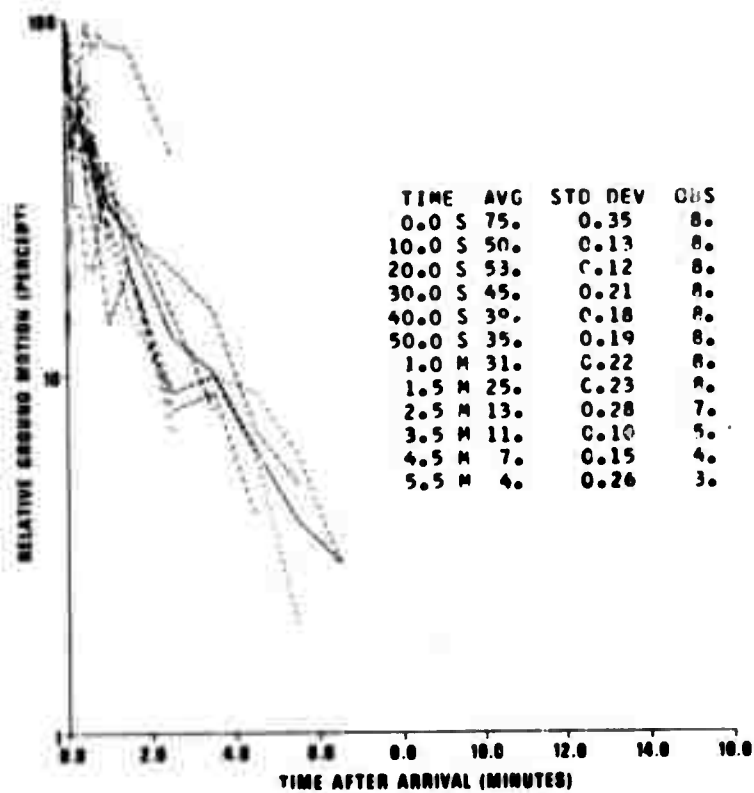


Figure 94. P coda characteristics, Aleutian Islands, SHI.

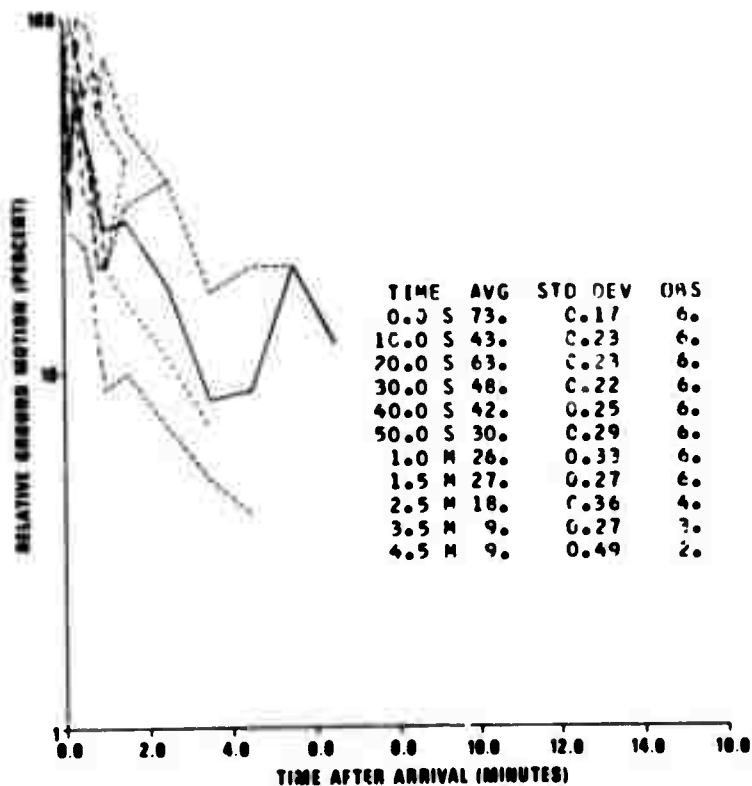


Figure 95. P coda characteristics, Aleutian Islands, WES.

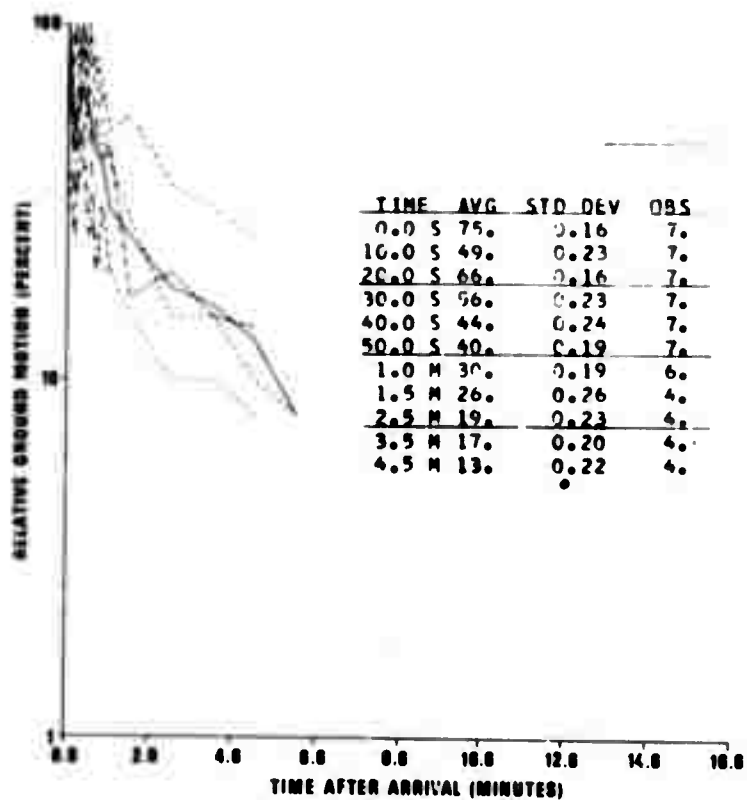


Figure 96. P coda characteristics, Kamchatka-Kurile Islands, ADE.

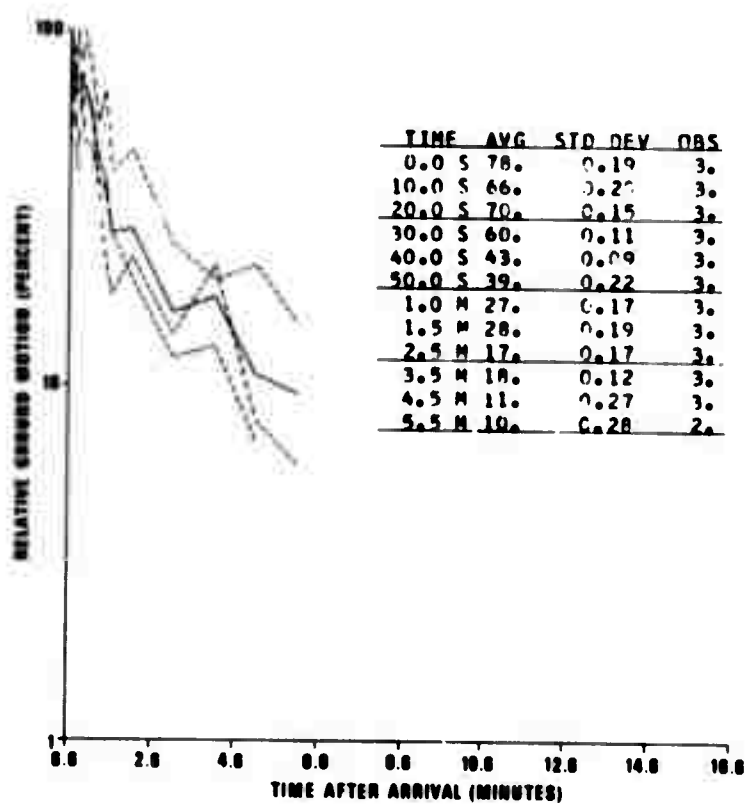


Figure 97. P coda characteristics, Kamchatka-Kurile Islands, AQU.

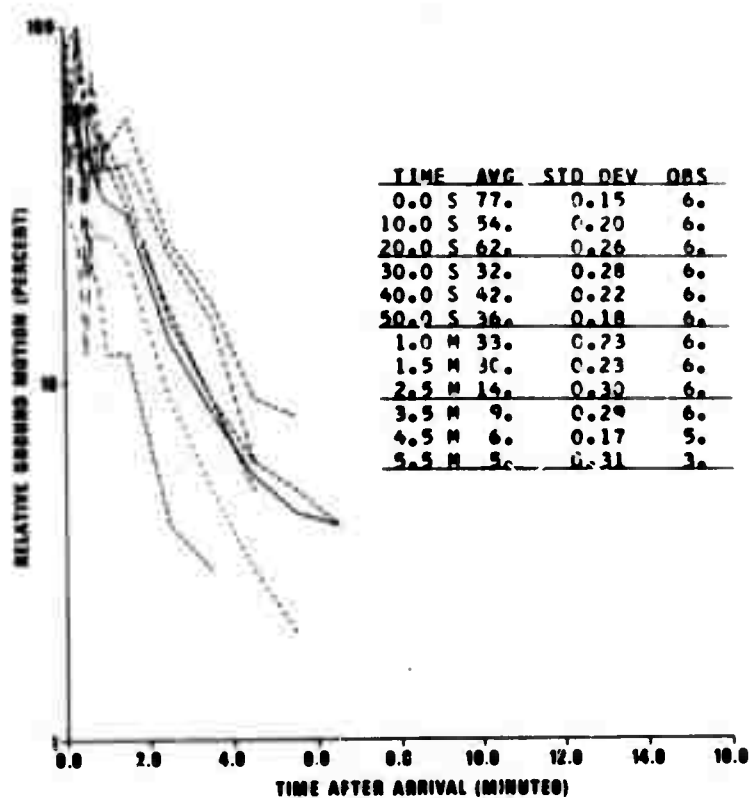


Figure 98. P coda characteristics, Kamchatka-Kurile Islands, BOZ.

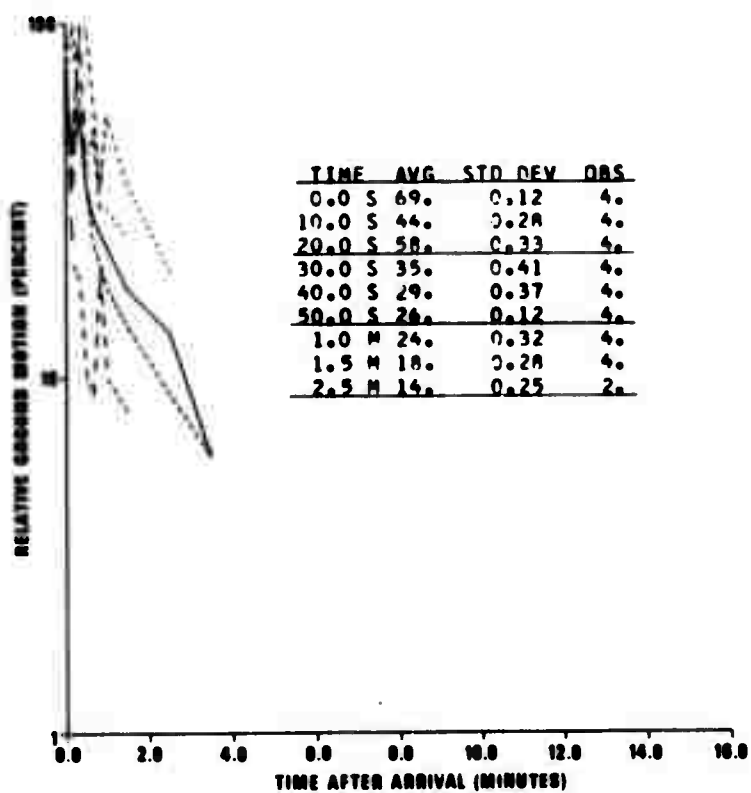


Figure 99. P coda characteristics, Kamchatka-Kurile Islands, CHG.

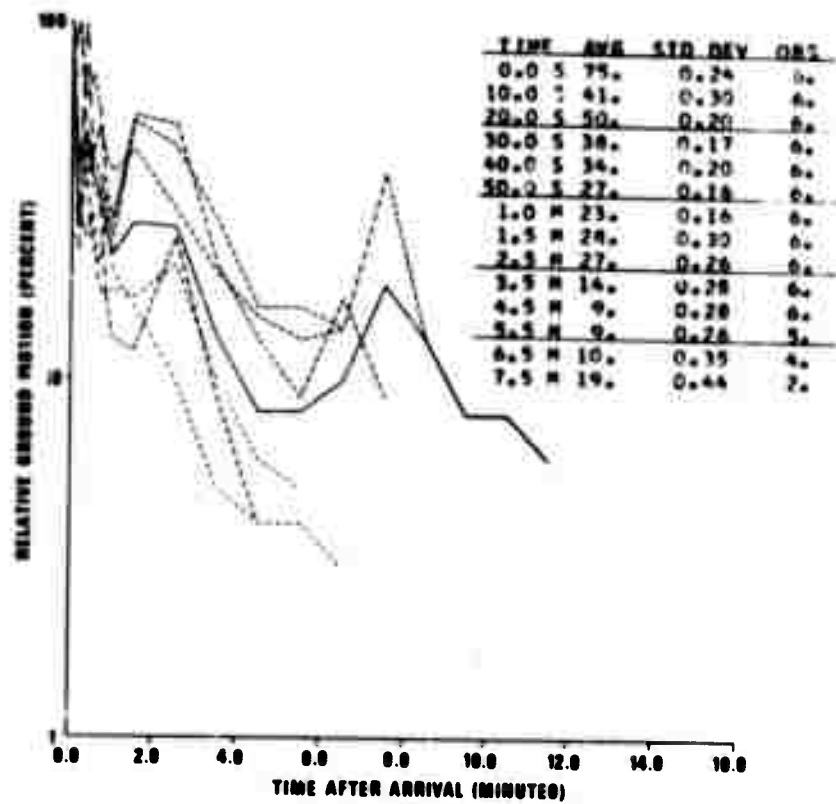


Figure 100. P coda characteristics, Kamchatka-Kurile Islands, CMC.

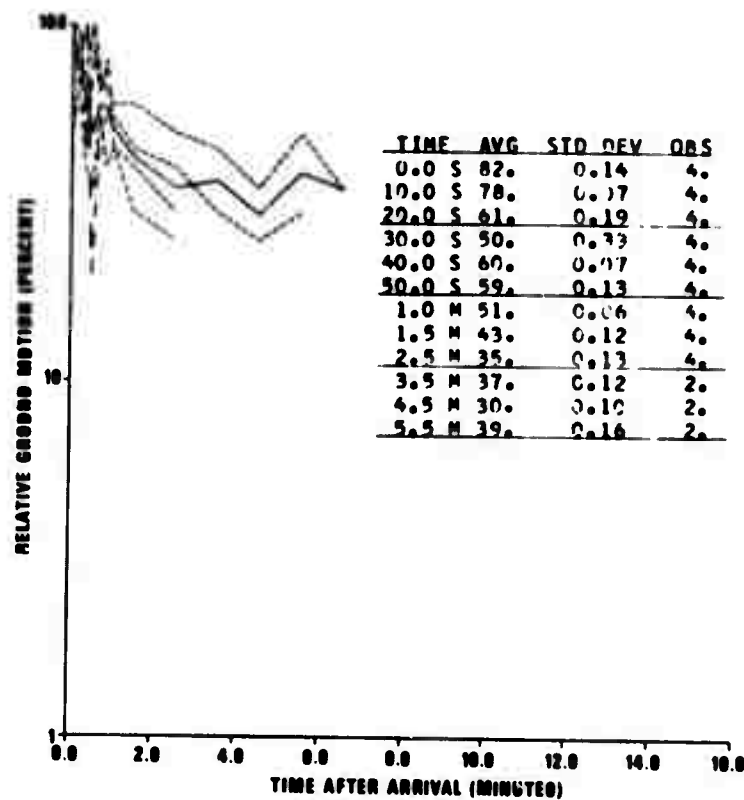


Figure 101. P coda characteristics, Kamchatka-Kurile Islands, DAL.

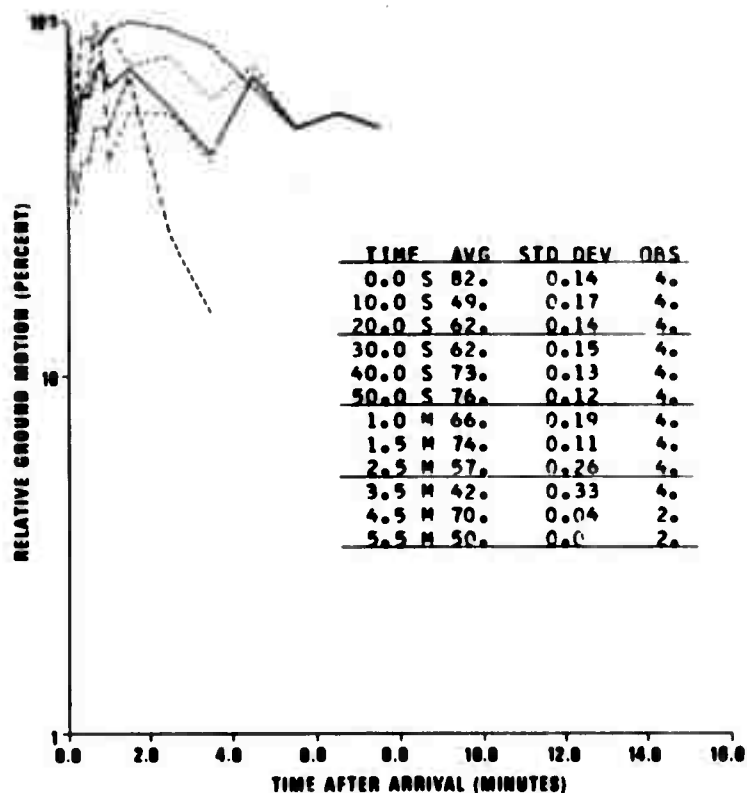


Figure 102. P coda characteristics, Kamchatka-Kurile Islands, DAV.

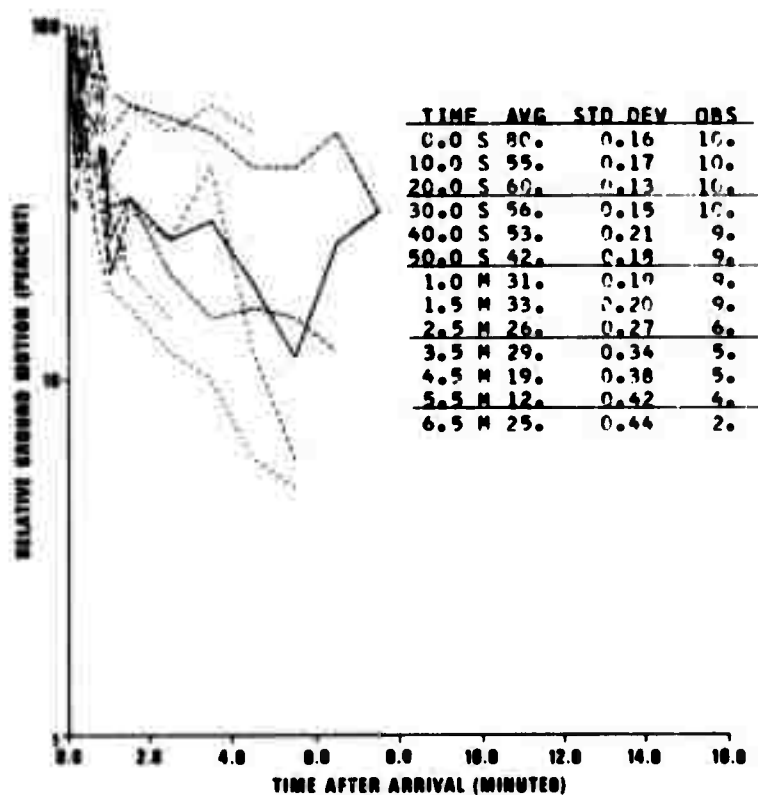


Figure 103. P coda characteristics, Kamchatka-Kurile Islands, IST.

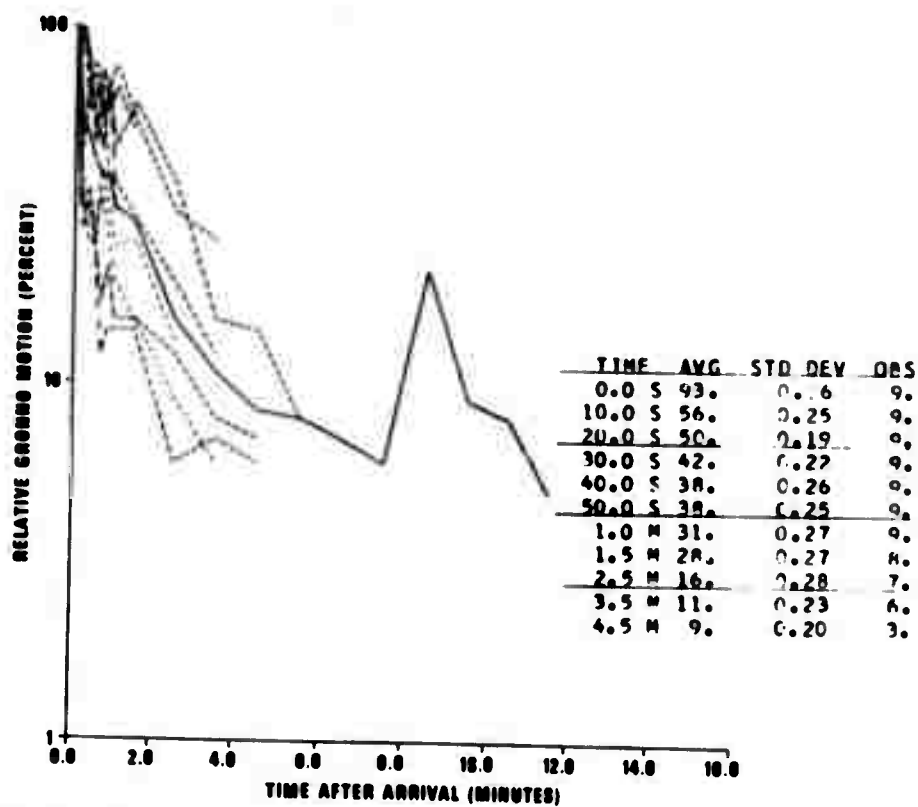


Figure 104. P coda characteristics, Kamchatka-Kurile Islands, KBL.

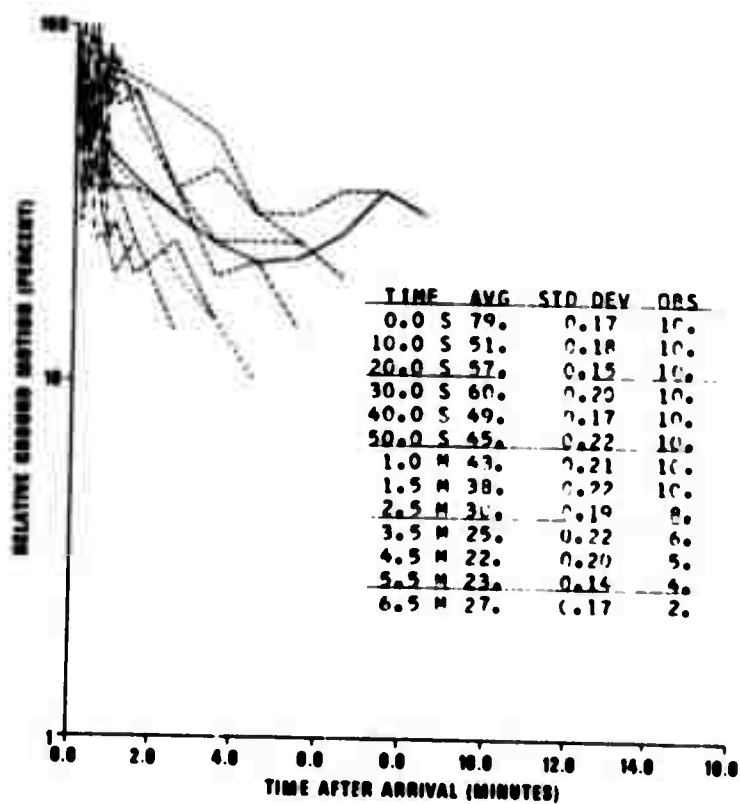


Figure 105. P coda characteristics, Kamchatka-Kurile Islands, KON.

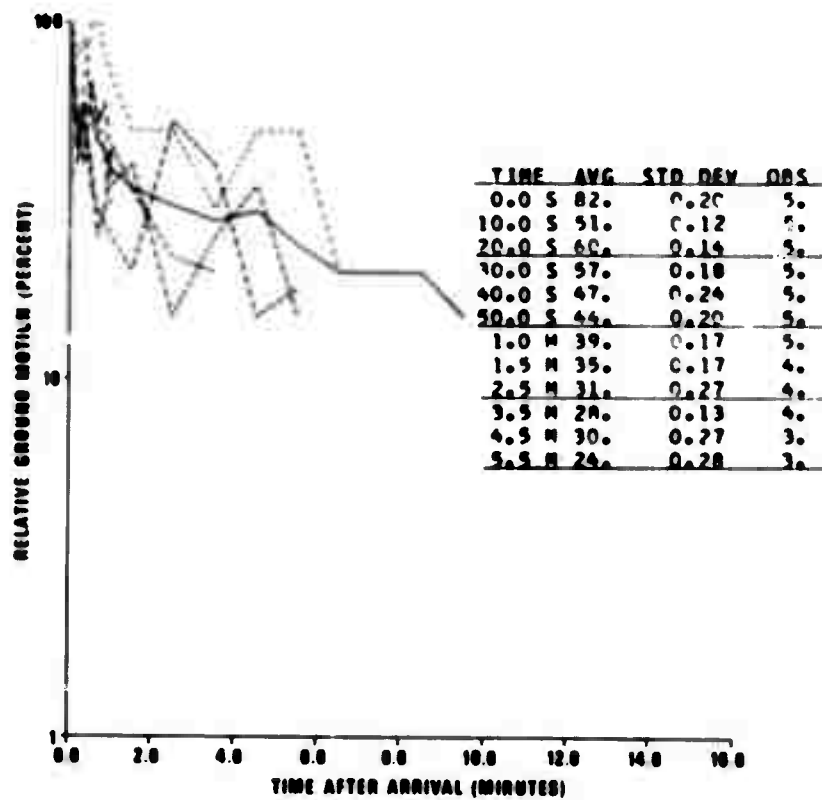


Figure 106. P coda characteristics, Kamchatka-Kurile Islands, MAL.

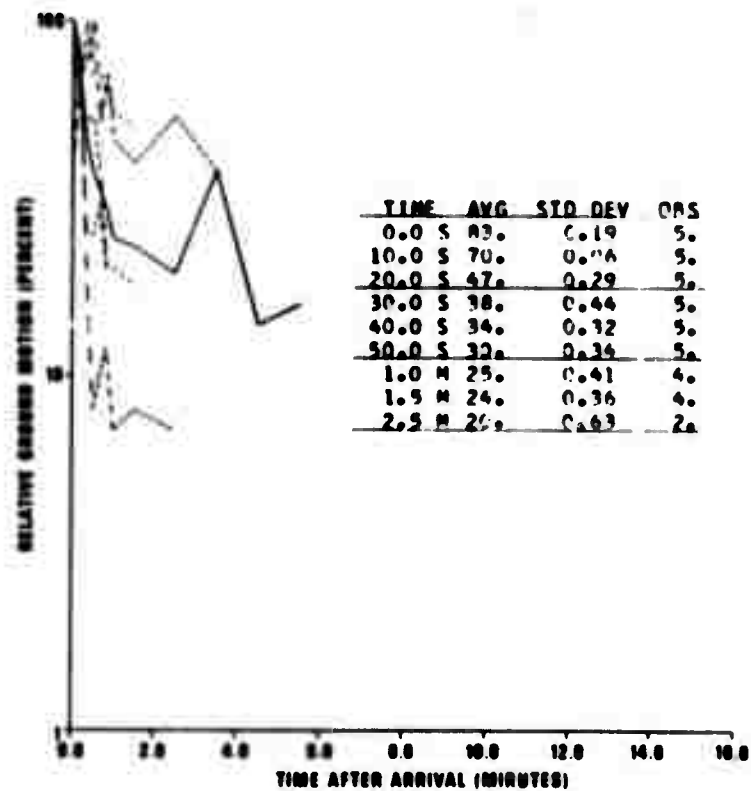


Figure 107. P coda characteristics, Kamchatka-Kurile Islands, MAT.

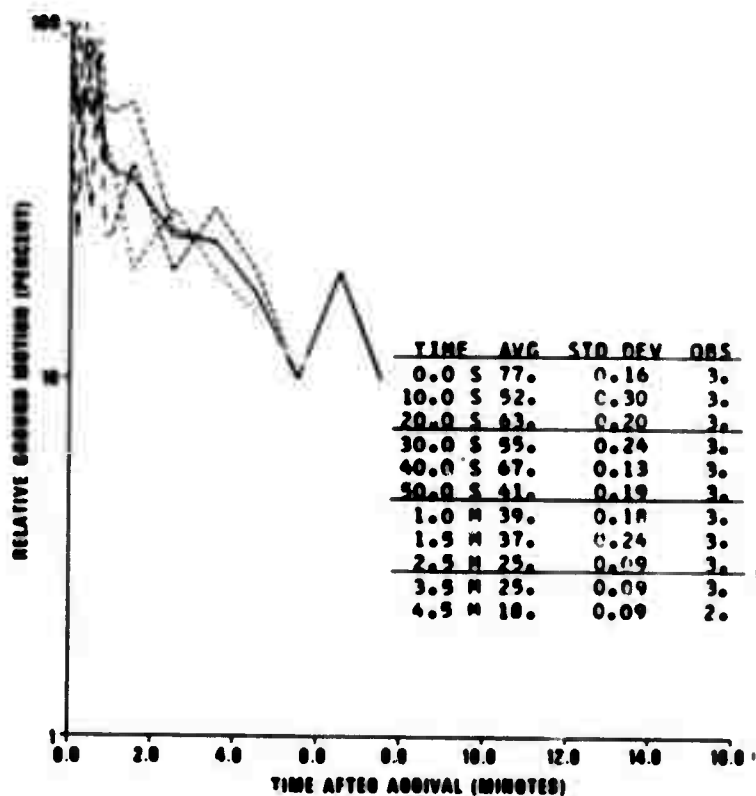


Figure 108. P coda characteristics, Kamchatka-Kurile Islands, MUN.

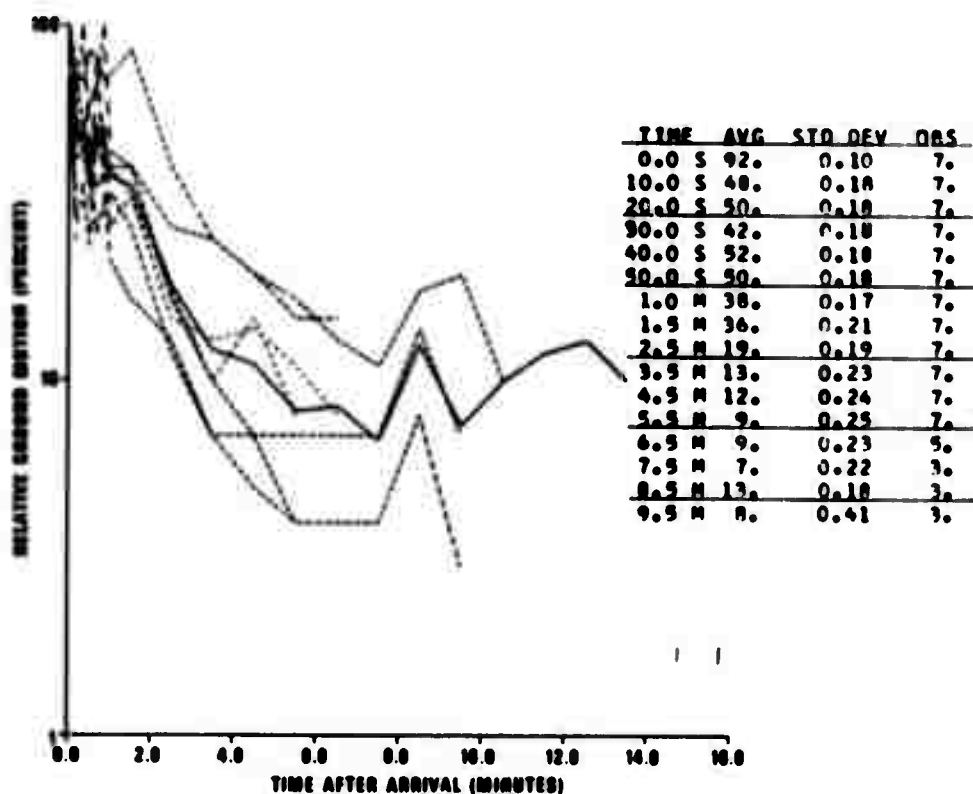


Figure 109. P coda characteristics, Kamchatka-Kurile Islands, NDI.

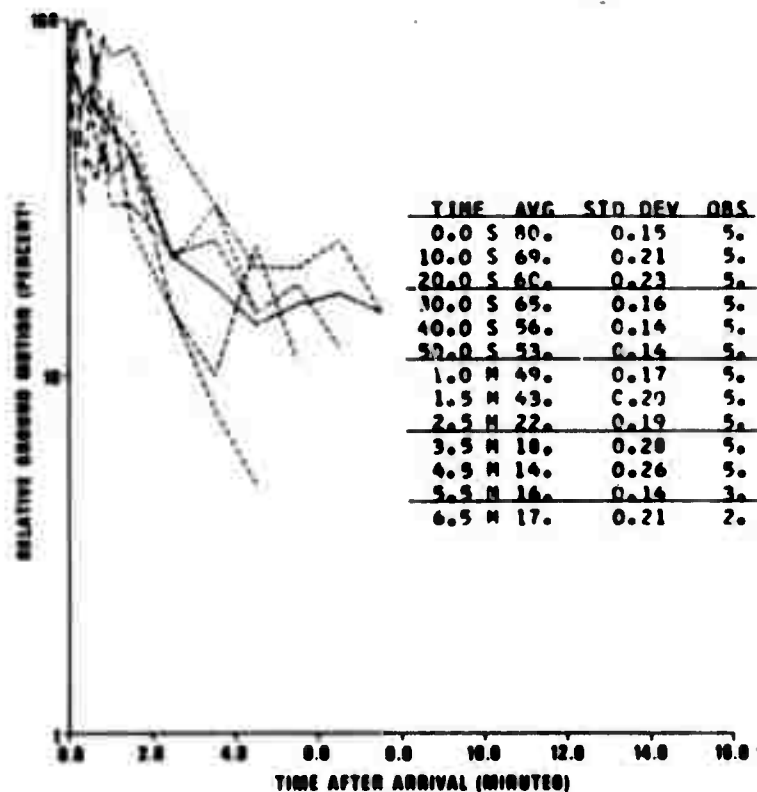


Figure 110. P coda characteristics, Kamchatka-Kurile Islands, SEO.

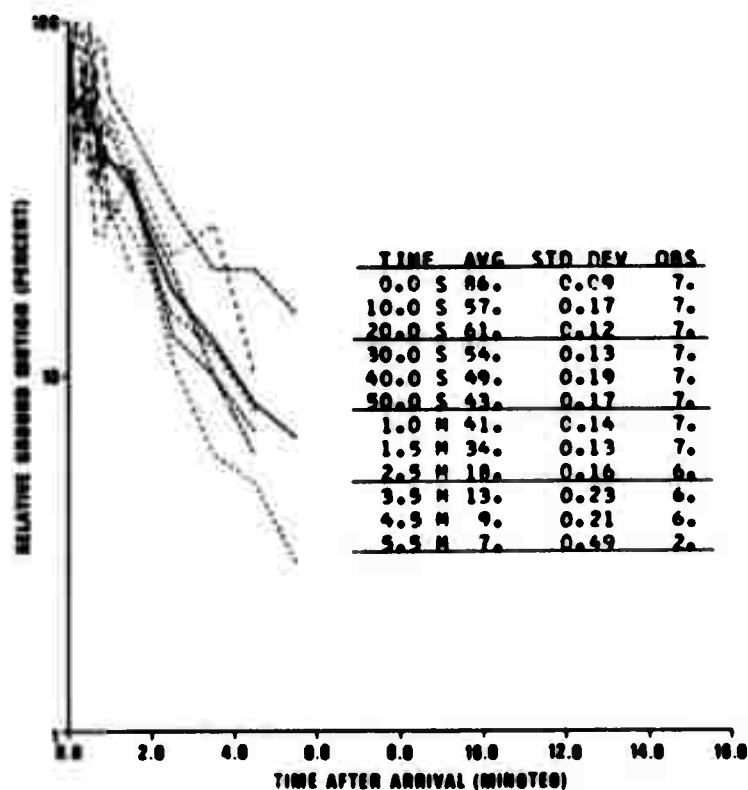


Figure 111. P coda characteristics, Kamchatka-Kurile Islands, SHI.

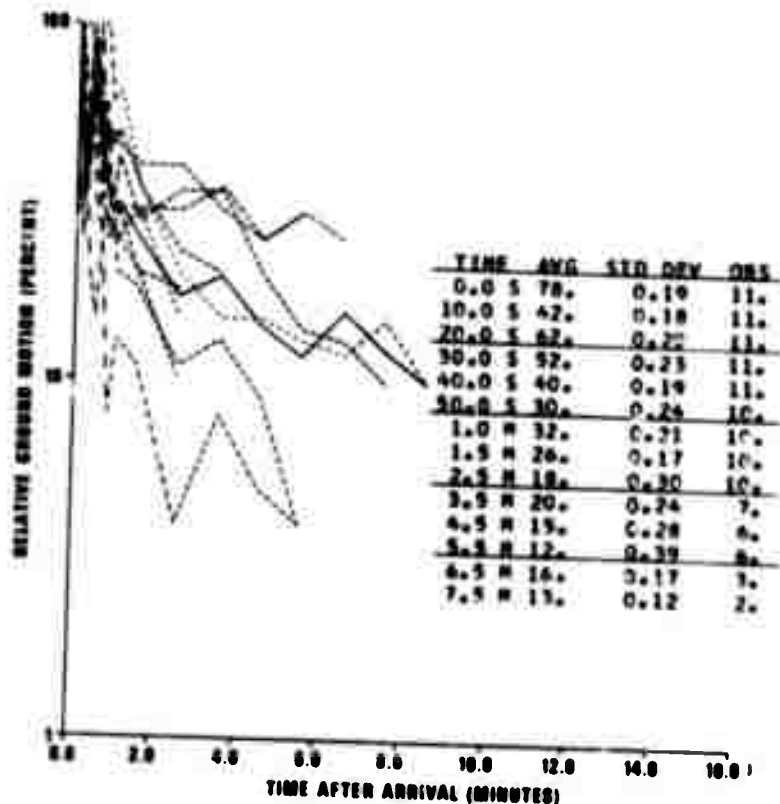


Figure 112. P coda characteristics, Kamchatka-Kurile Islands, WES.

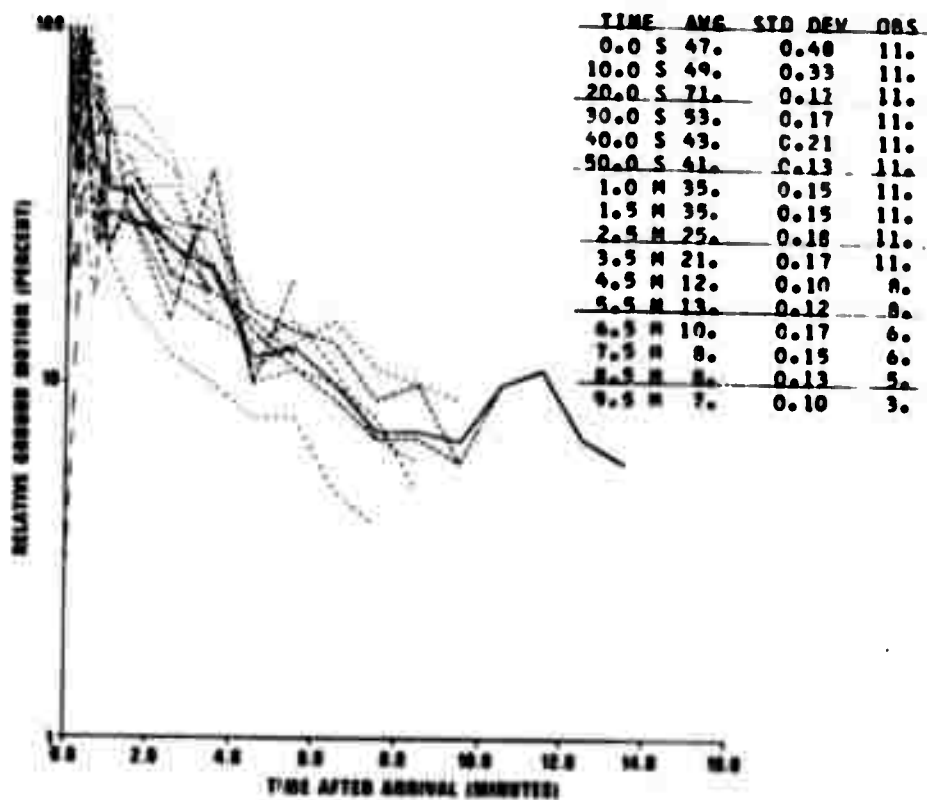


Figure 113. P coda characteristics, Japan, ADE.

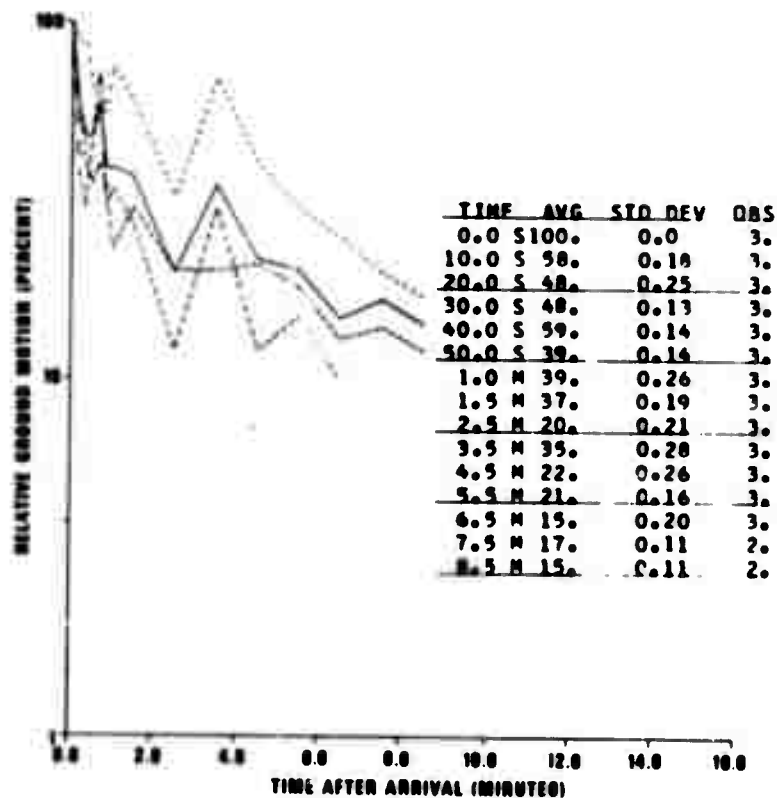


Figure 114. P coda characteristics, Japan, AQU.

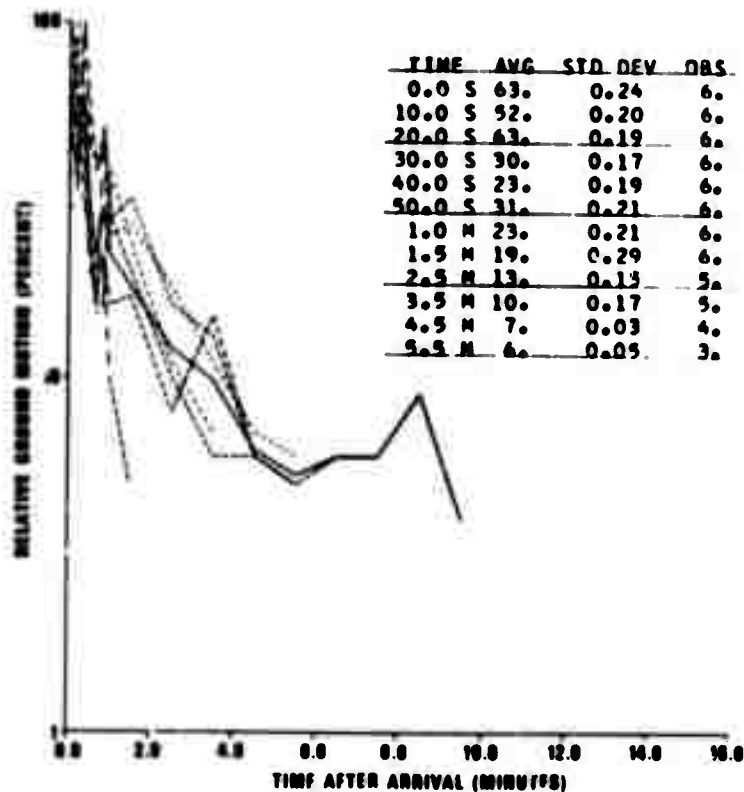


Figure 115. P coda characteristics, Japan, BOZ.

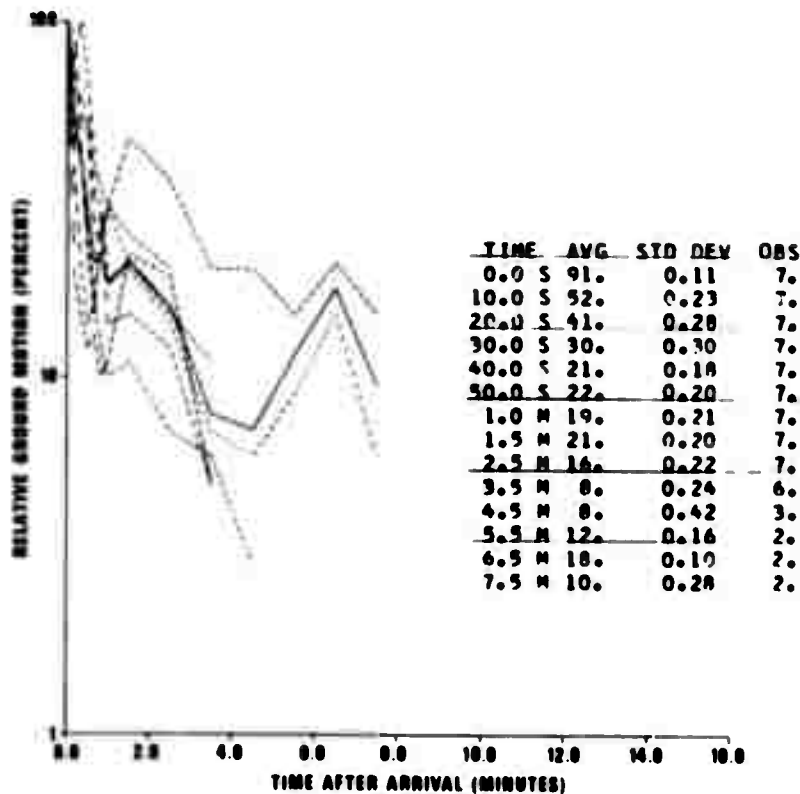


Figure 116. P coda characteristics, Japan, CHG.

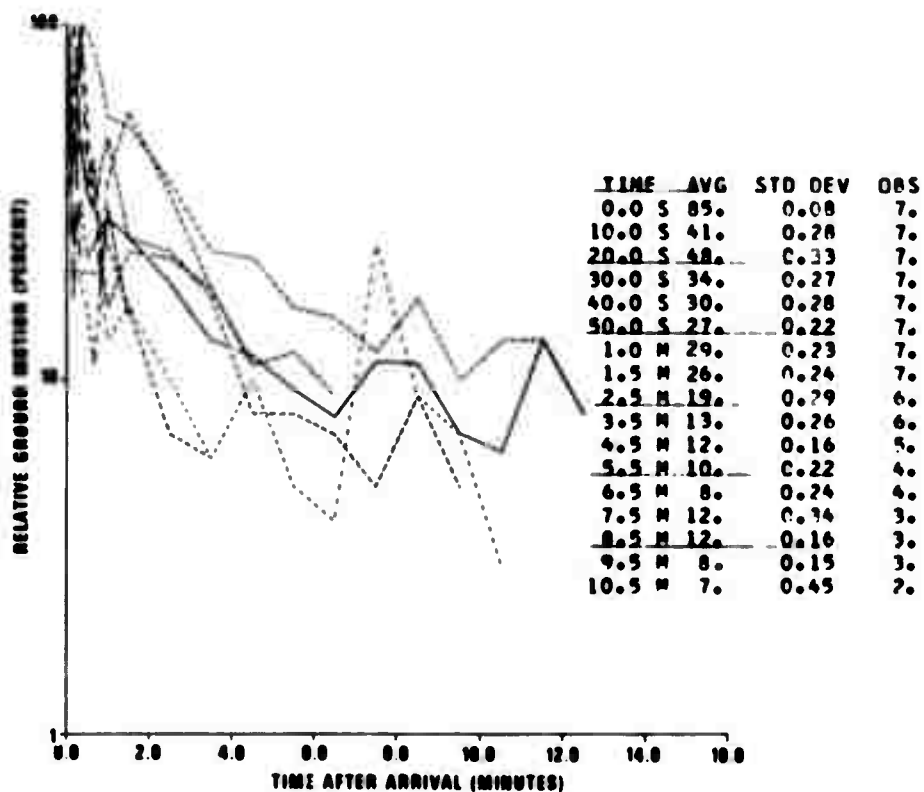


Figure 117. P coda characteristics, Japan, CMC.

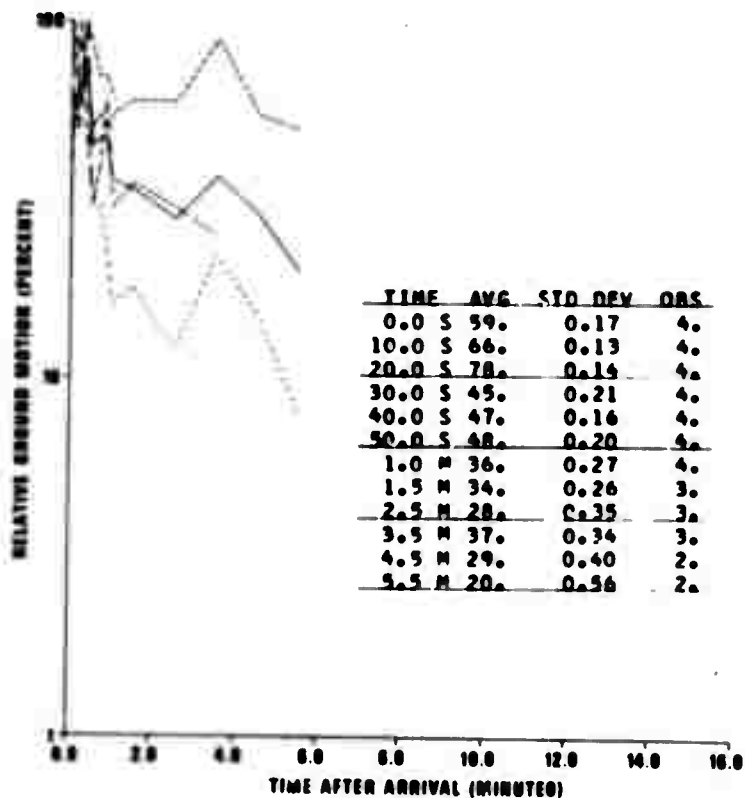


Figure 118. P coda characteristics, Japan, DAL.

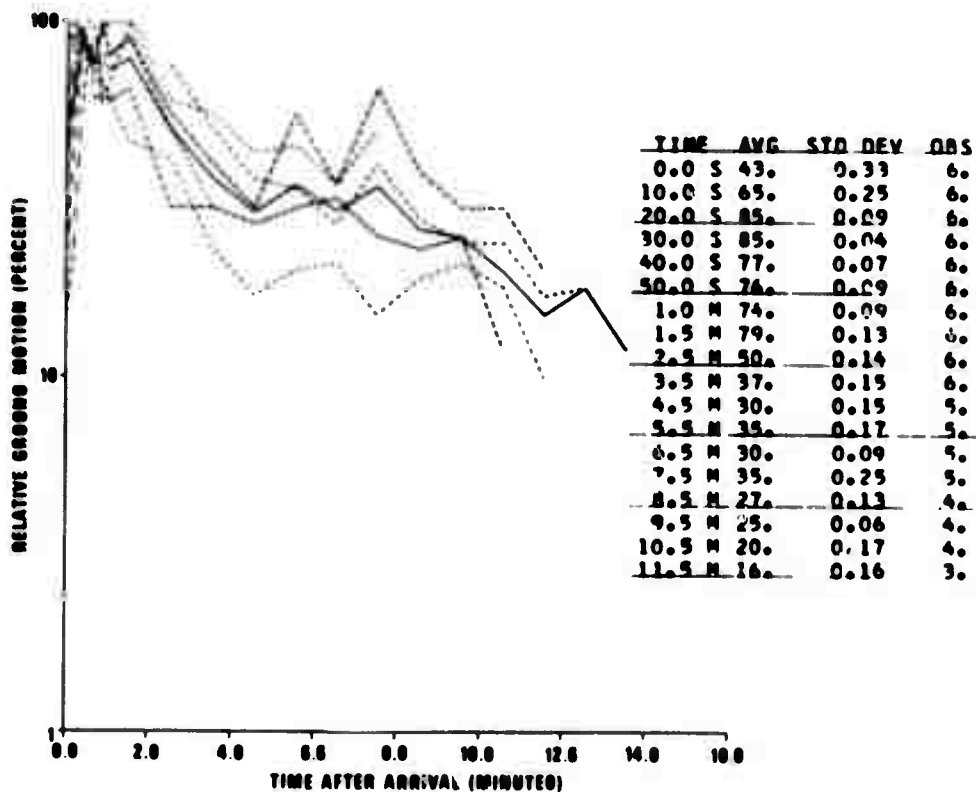


Figure 119. P coda characteristics, Japan, DAV.

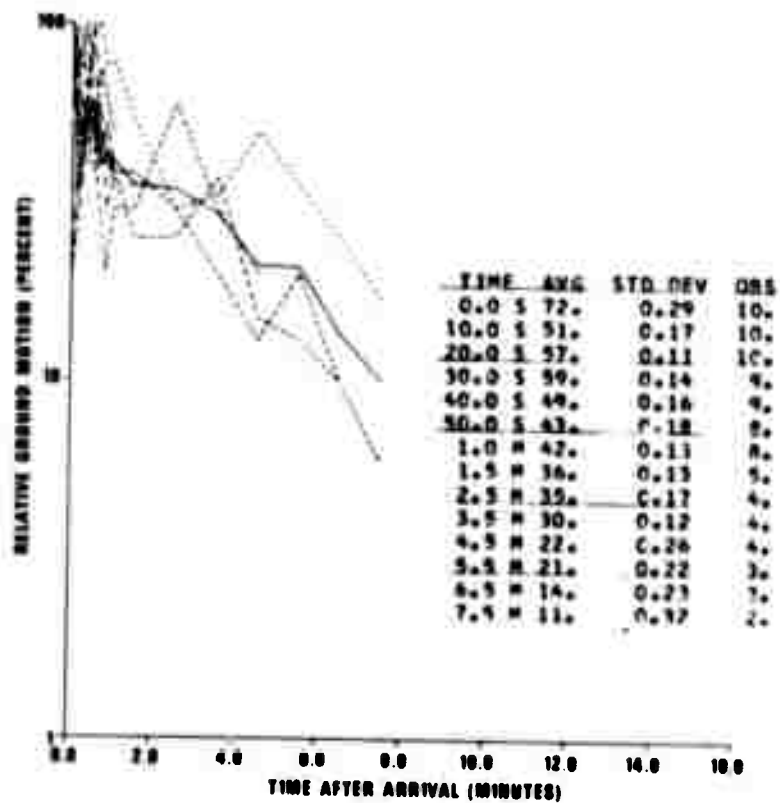


Figure 120. P coda characteristics, Japan, IST.

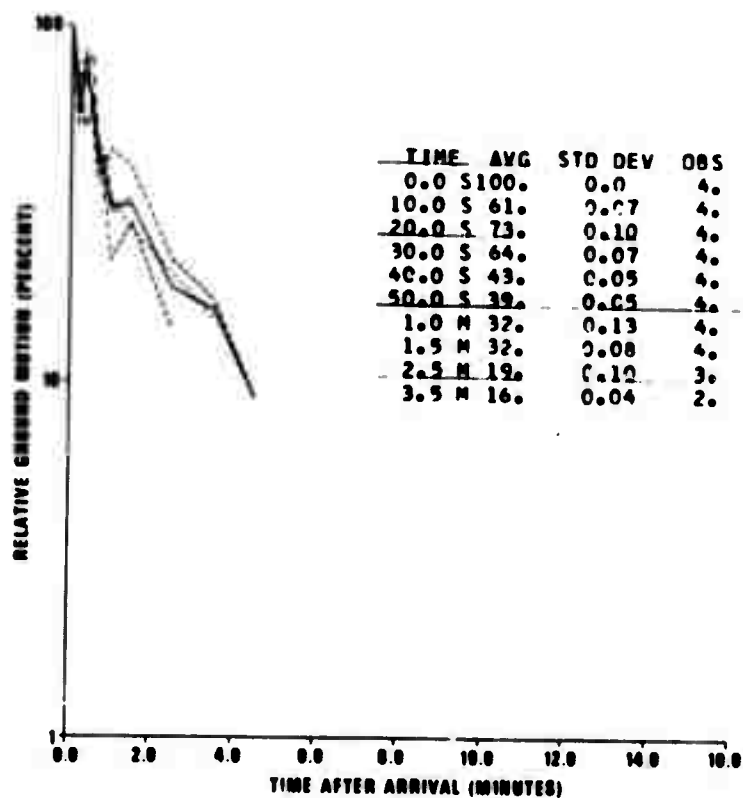


Figure 121. P coda characteristics, Japan, KBL.

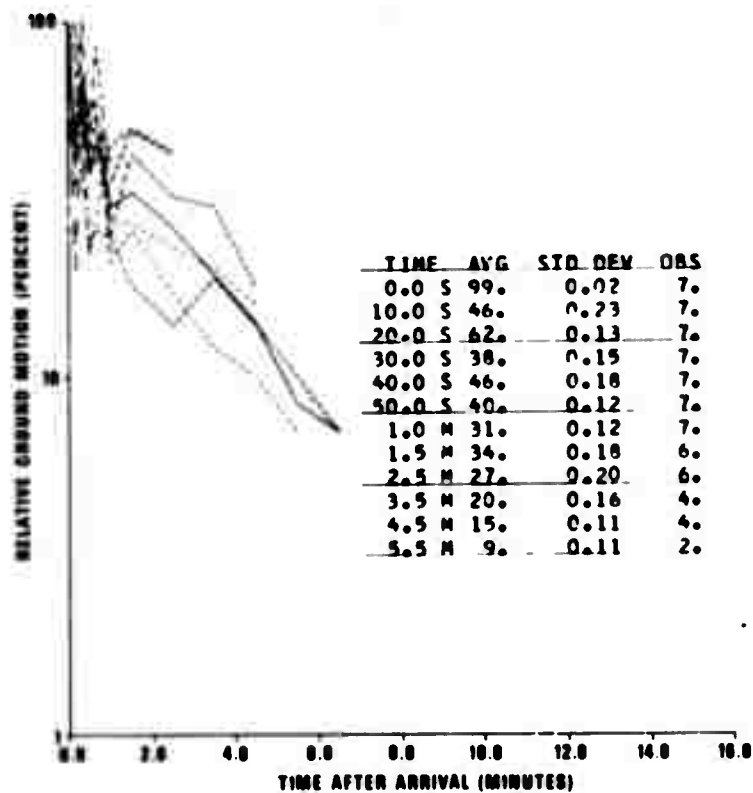


Figure 122. P coda characteristics, Japan, KON.

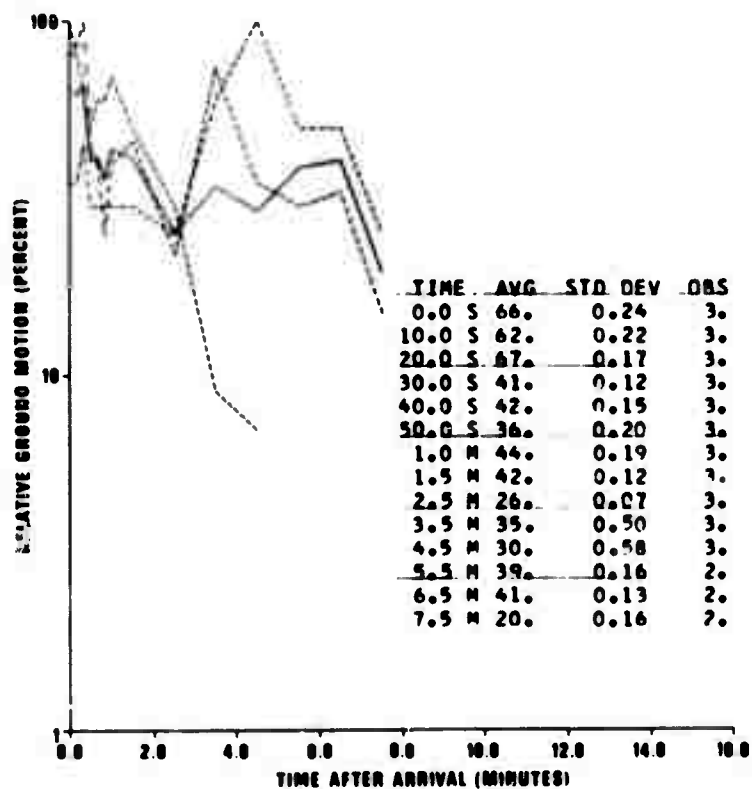


Figure 123. P coda characteristics, Japan, MAL.

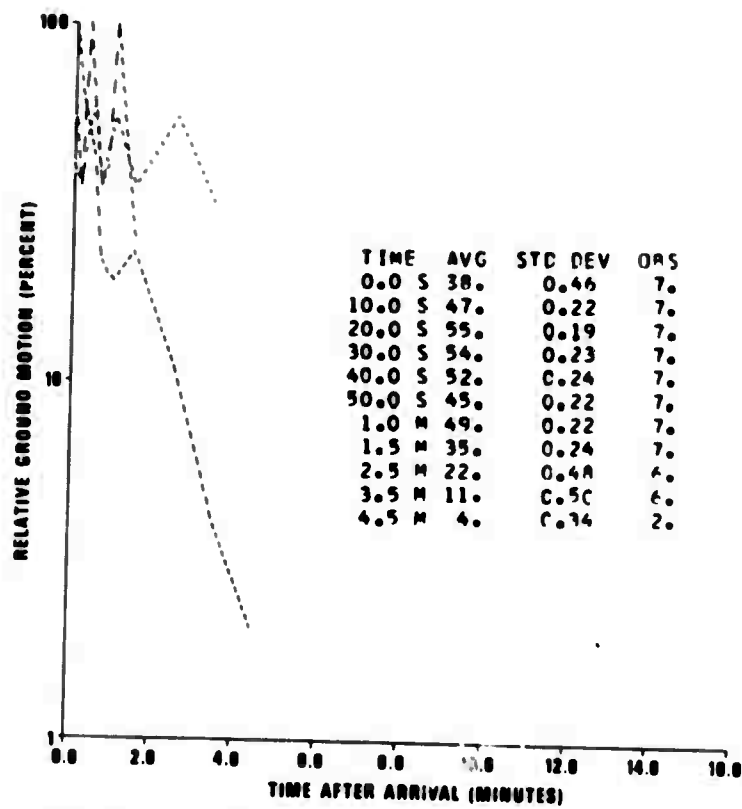


Figure 124. P coda characteristics, Japan, MAT.

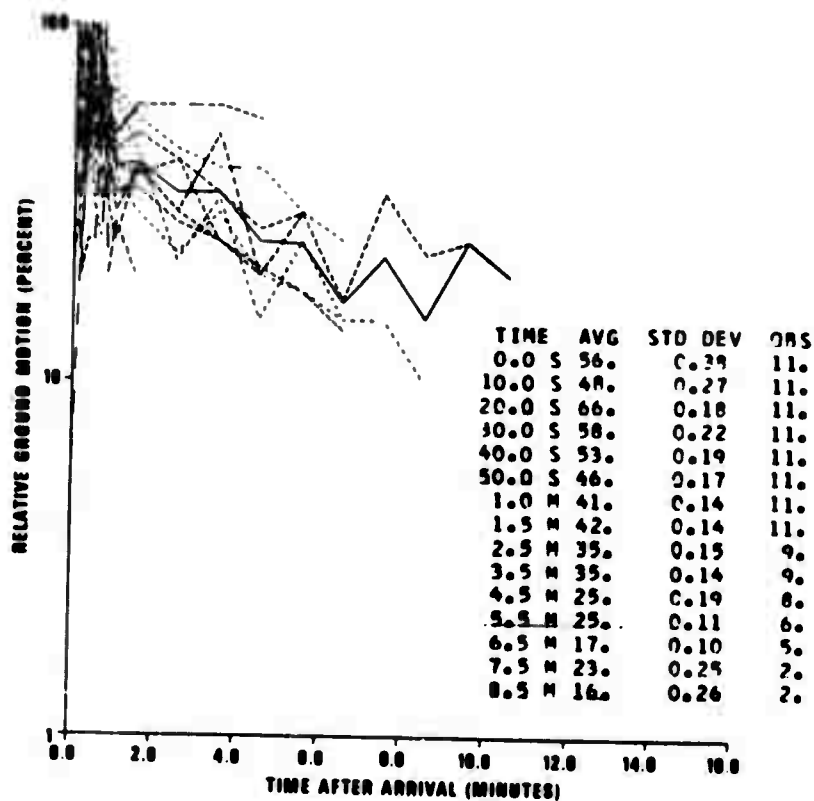


Figure 125. P coda characteristics, Japan, MUN.

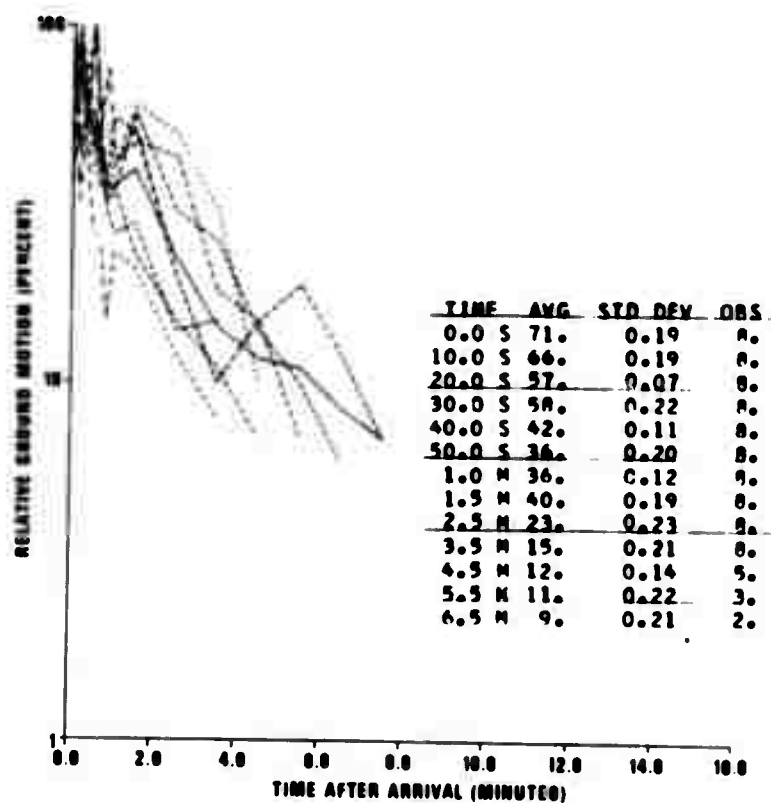


Figure 126. P coda characteristics, Japan, NDI.

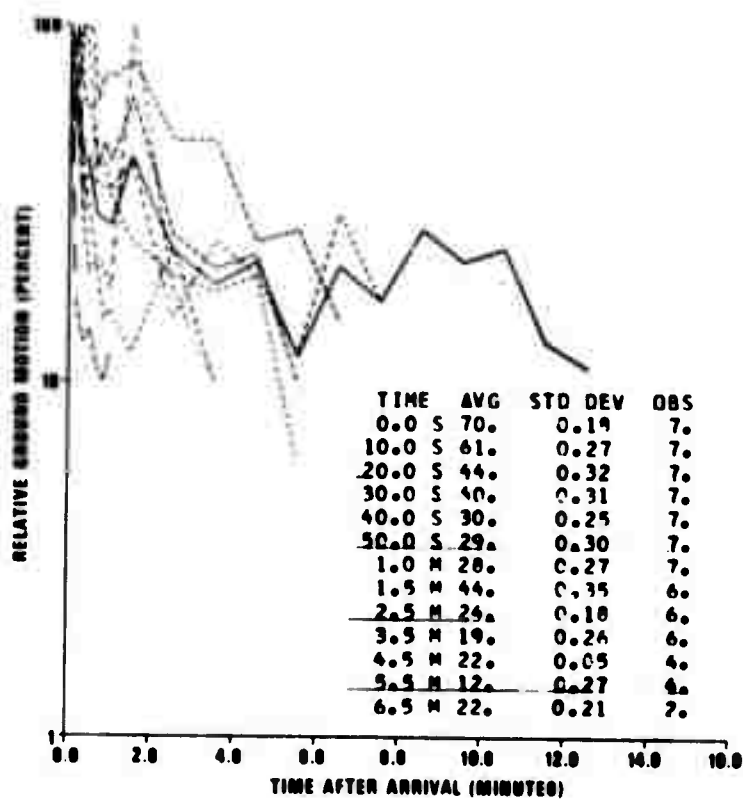


Figure 127. P coda characteristics, Japan, SEO.

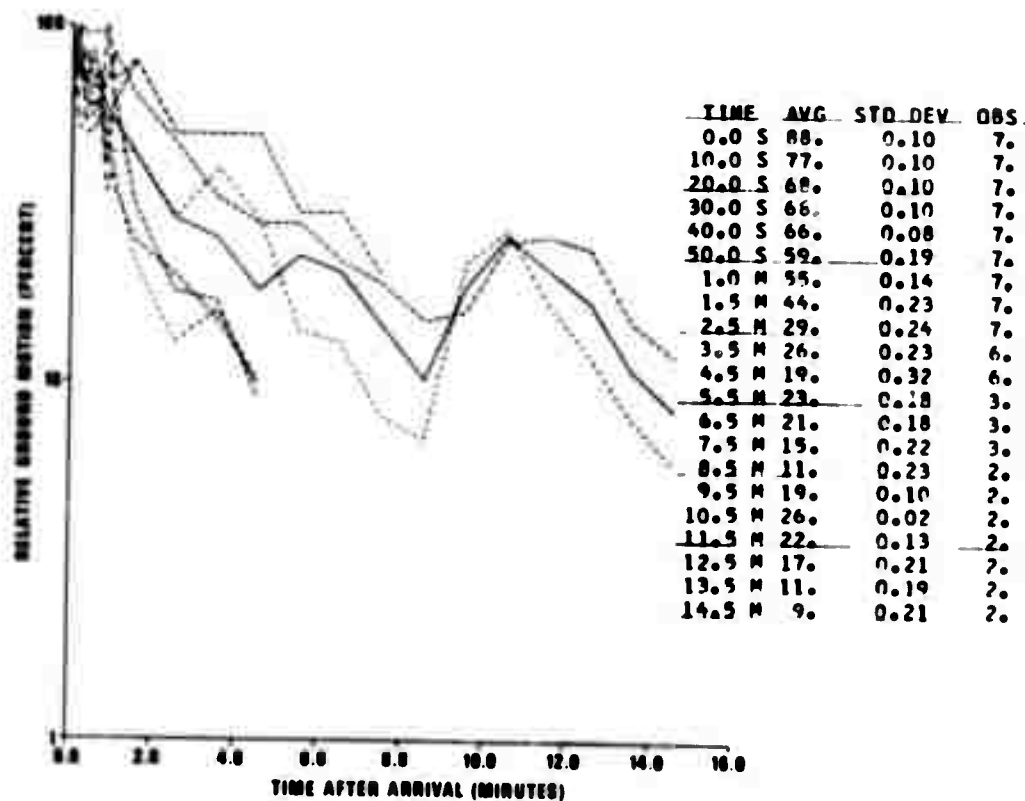


Figure 128. P coda characteristics, Japan, SHI.

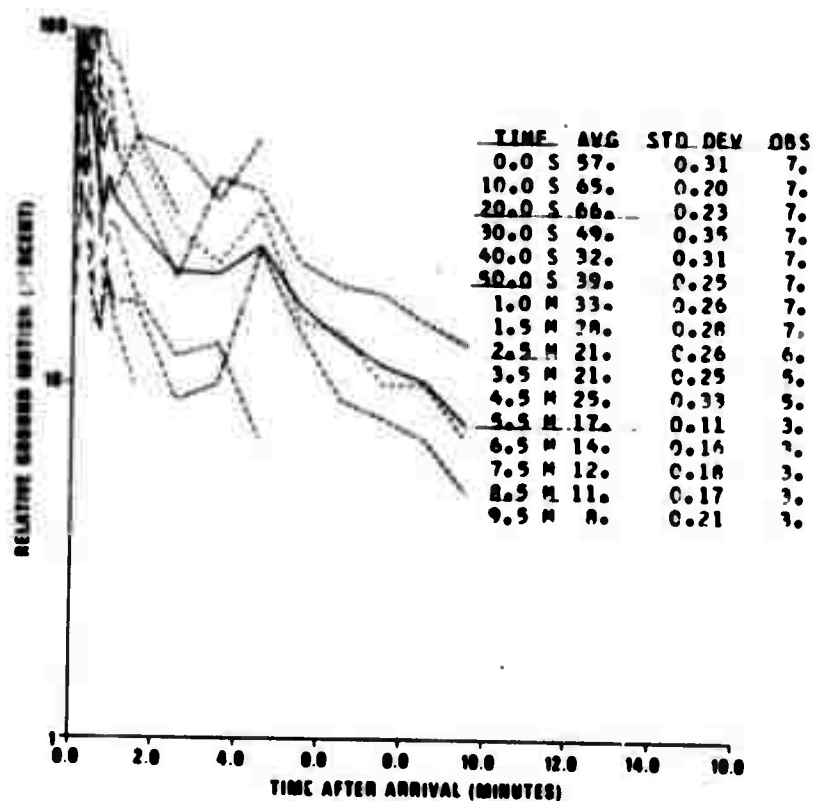


Figure 129. P coda characteristics, Japan, WES.

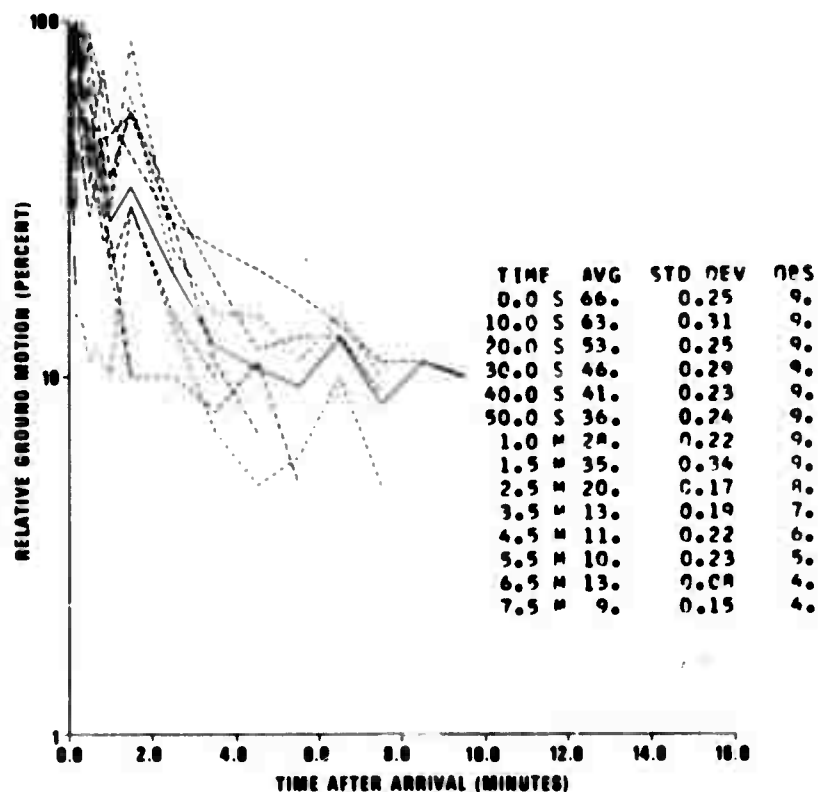


Figure 130. P coda characteristics, Philippine Islands-Taiwan, ADE.

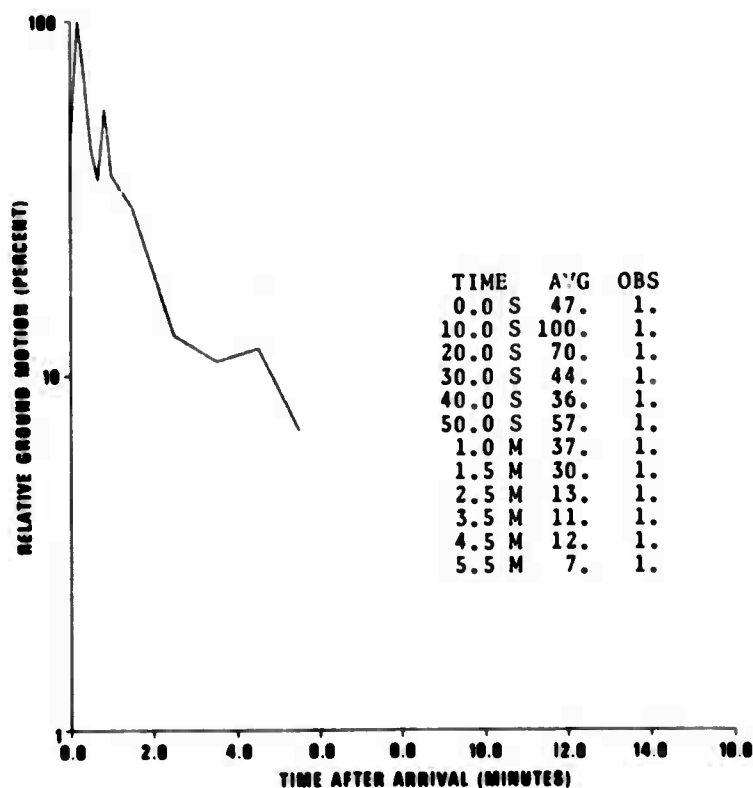


Figure 131. P coda characteristics, Philippine Islands-Taiwan, AQU.

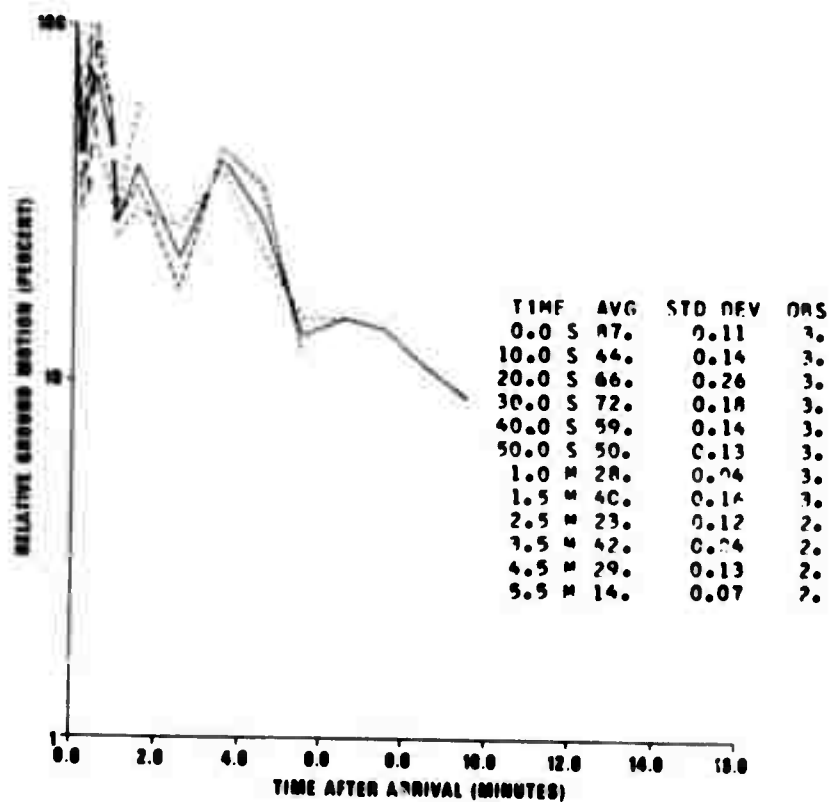


Figure 132. P coda characteristics, Philippine Islands-Taiwan, B02.

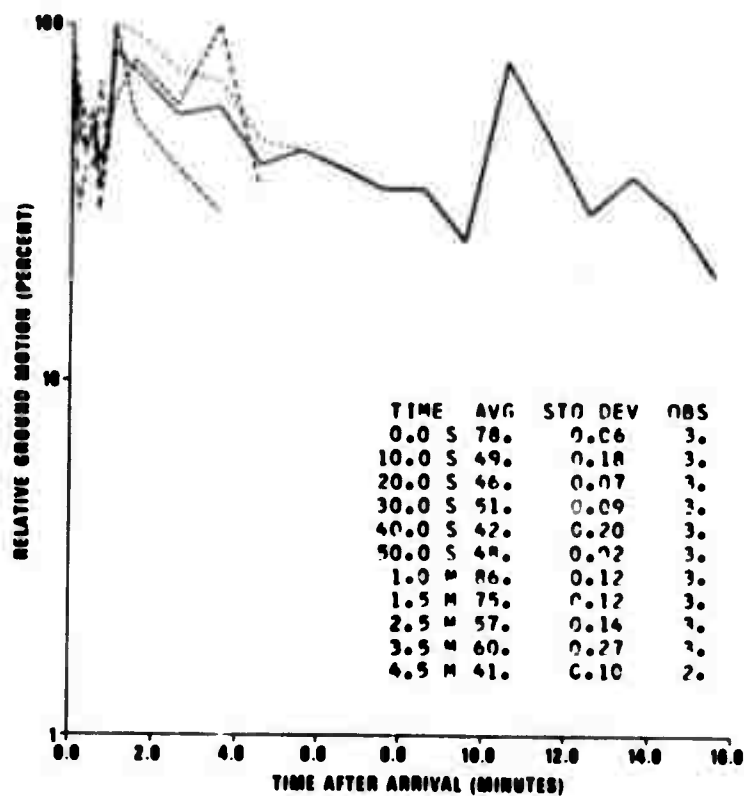


Figure 133. PKP coda characteristics, Philippine Islands-Taiwan, B02.

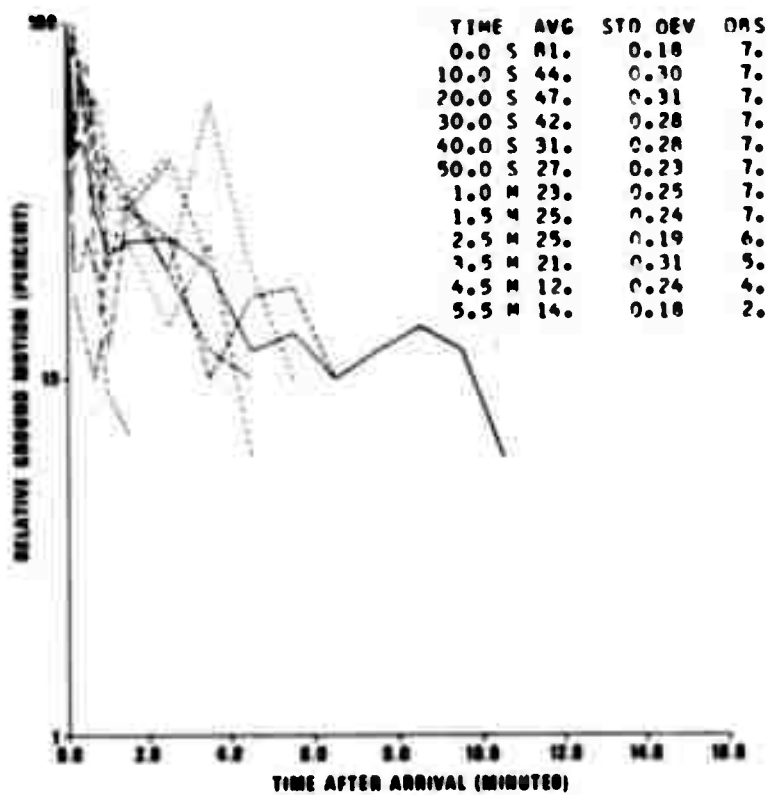


Figure 134. P coda characteristics, Philippine Islands-Taiwan, CHG.

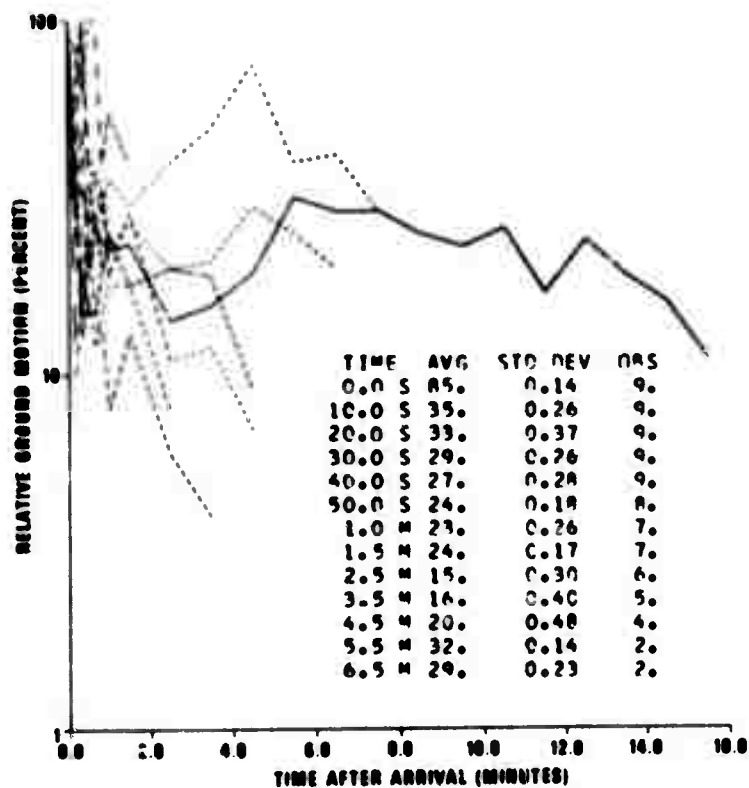


Figure 135. P coda characteristics, Philippine Islands-Taiwan, CMC.

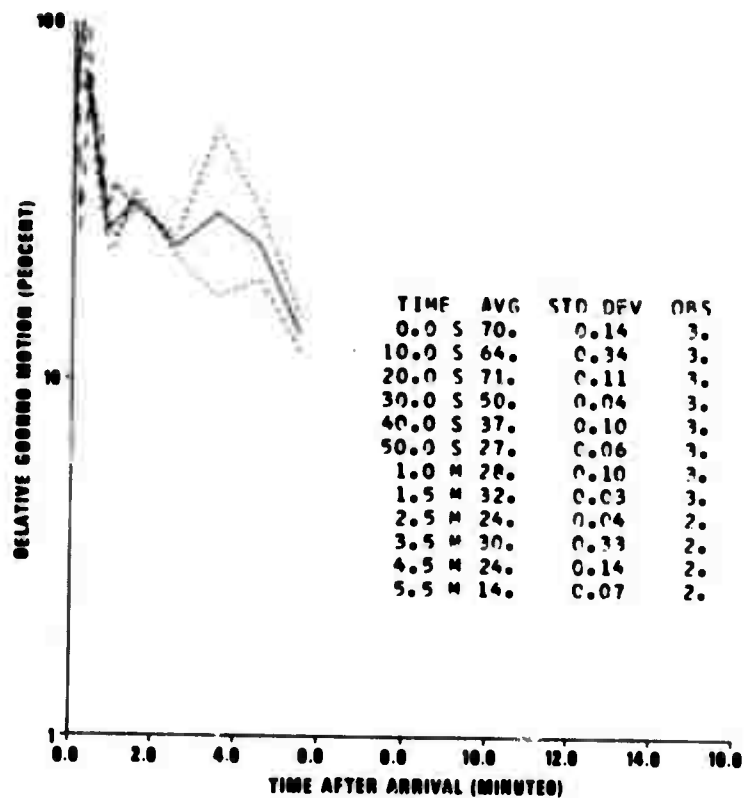


Figure 136. PKP coda characteristics, Philippine Islands-Taiwan, DAL.

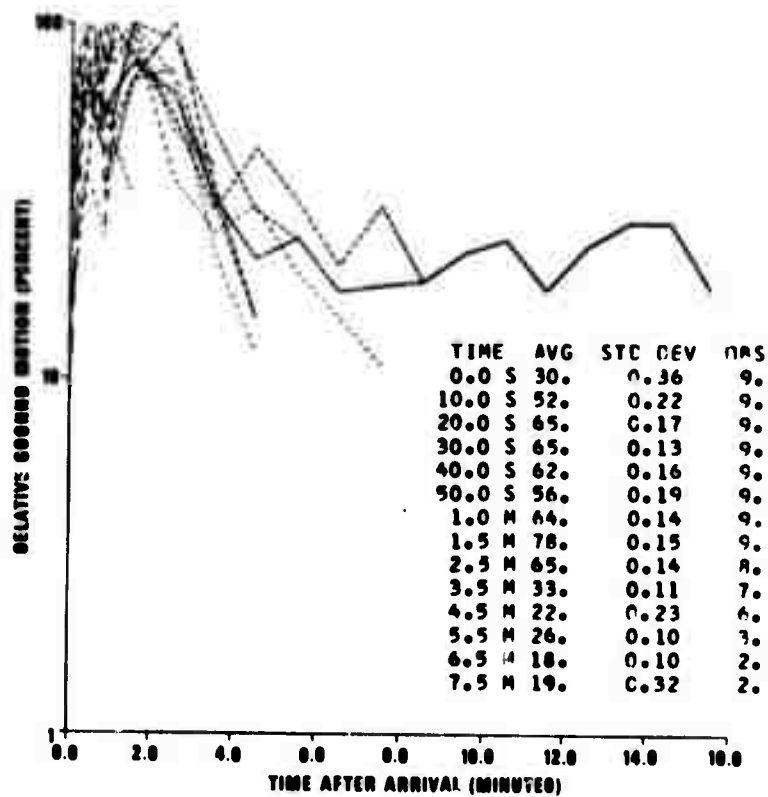


Figure 137. P coda characteristics, Philippine Islands-Taiwan, DAV.

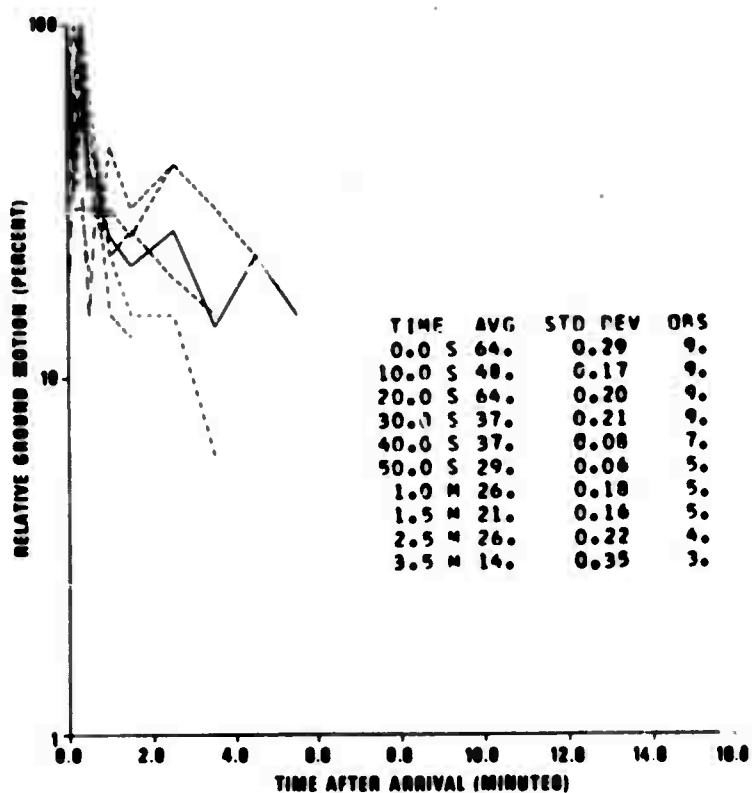


Figure 138. P coda characteristics, Philippine Islands-Taiwan, IST.

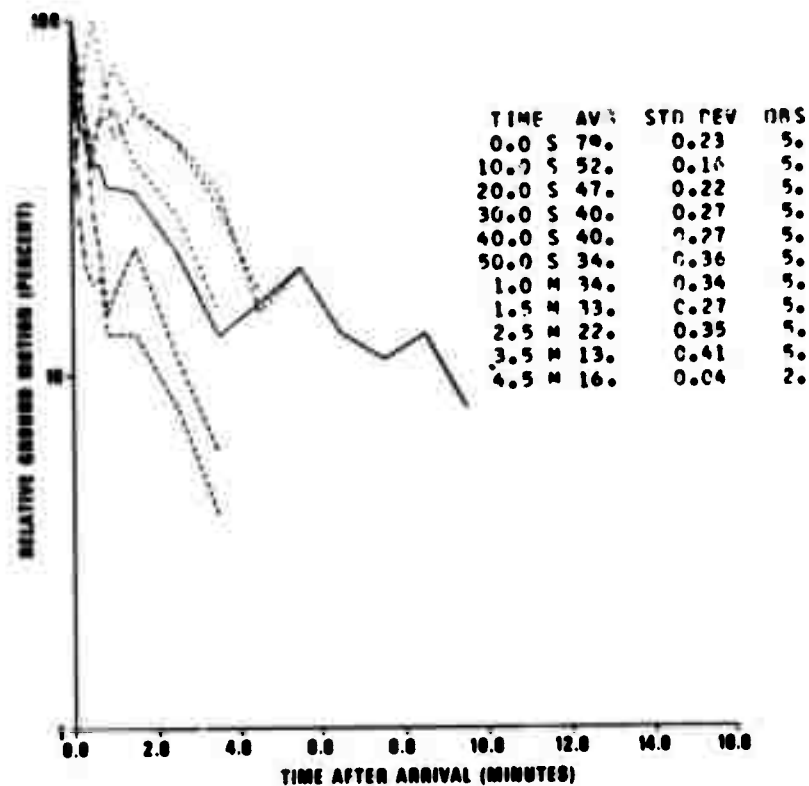


Figure 139. P coda characteristics, Philippine Islands-Taiwan, KBL.

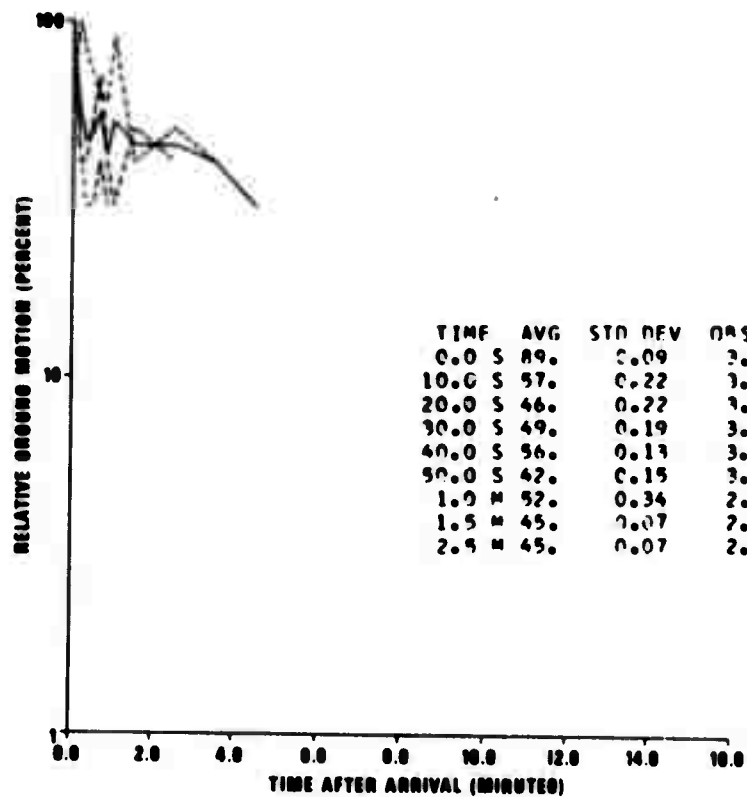


Figure 140. P coda characteristics, Philippine Islands-Taiwan, KON.

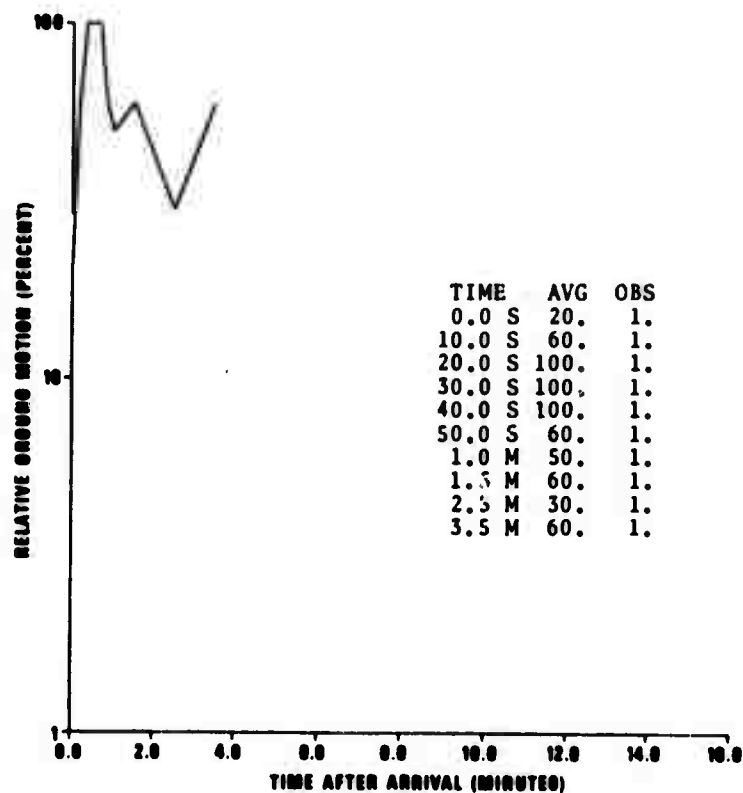


Figure 141. P coda characteristics, Philippine Islands-Taiwan, MAL.

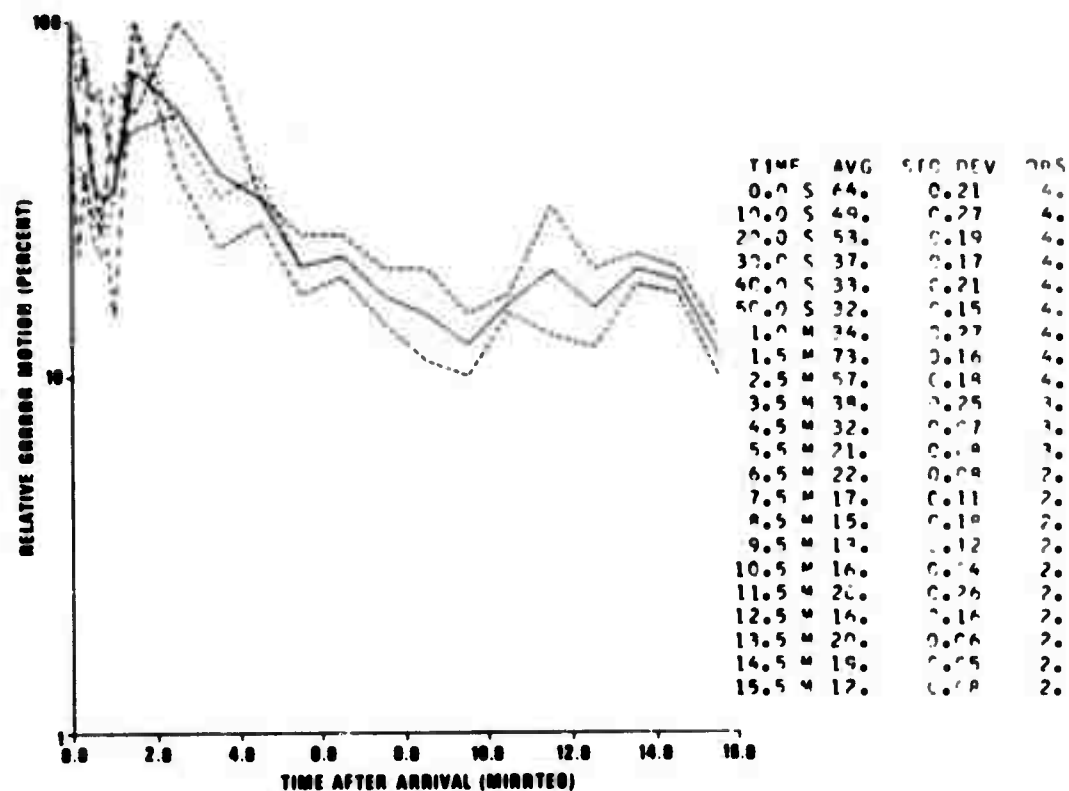


Figure 142. PKP coda characteristics, Philippine Islands-Taiwan, MAL.

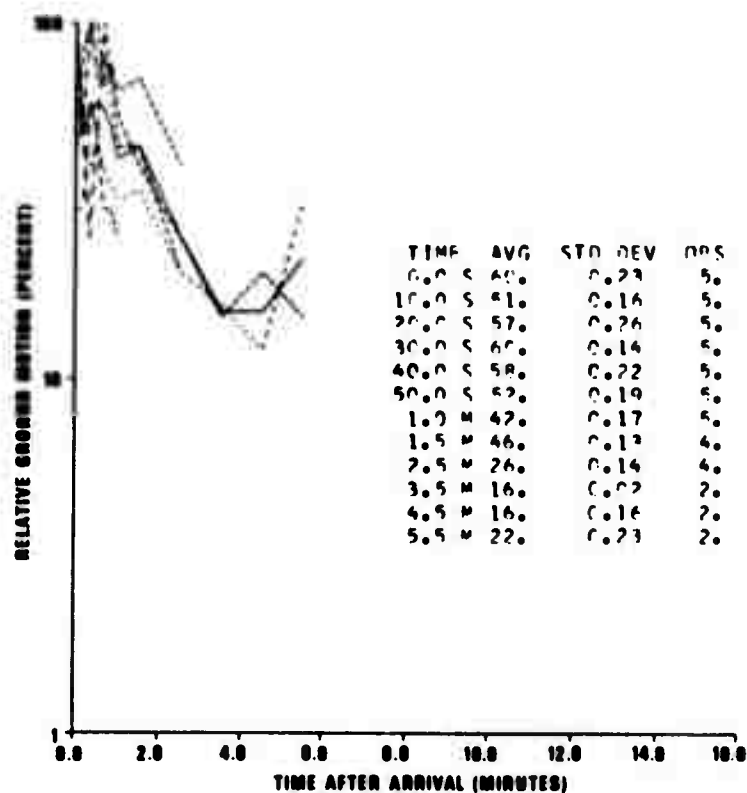


Figure 143. P coda characteristics, Philippine Islands-Taiwan, MAT.

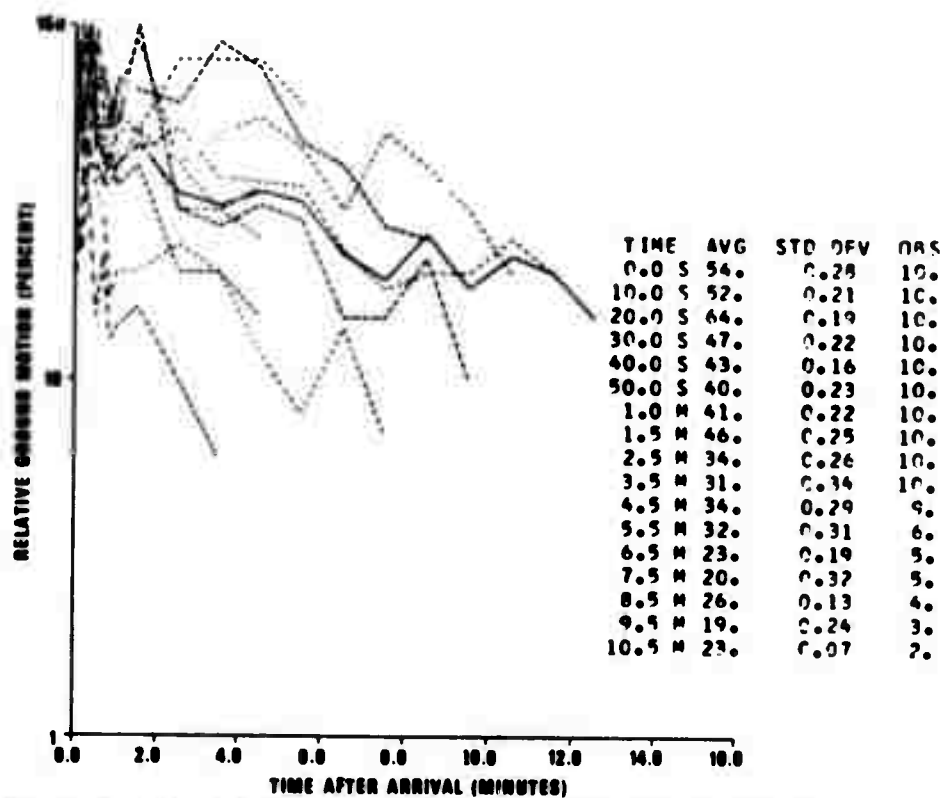


Figure 144. P coda characteristics, Philippine Islands-Taiwan, MUN.

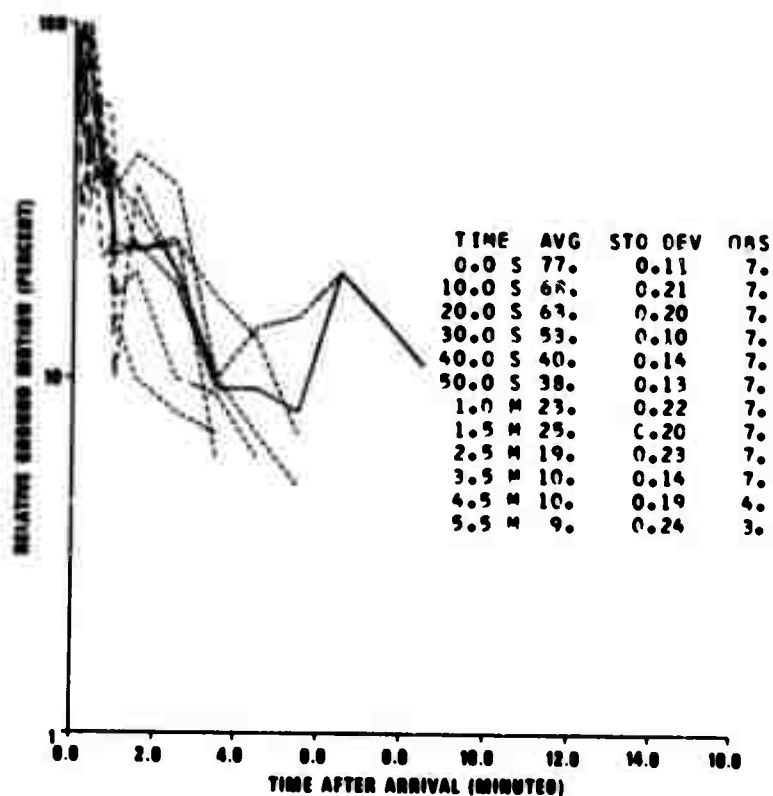


Figure 145. P coda characteristics, Philippine Islands-Taiwan, NDI.

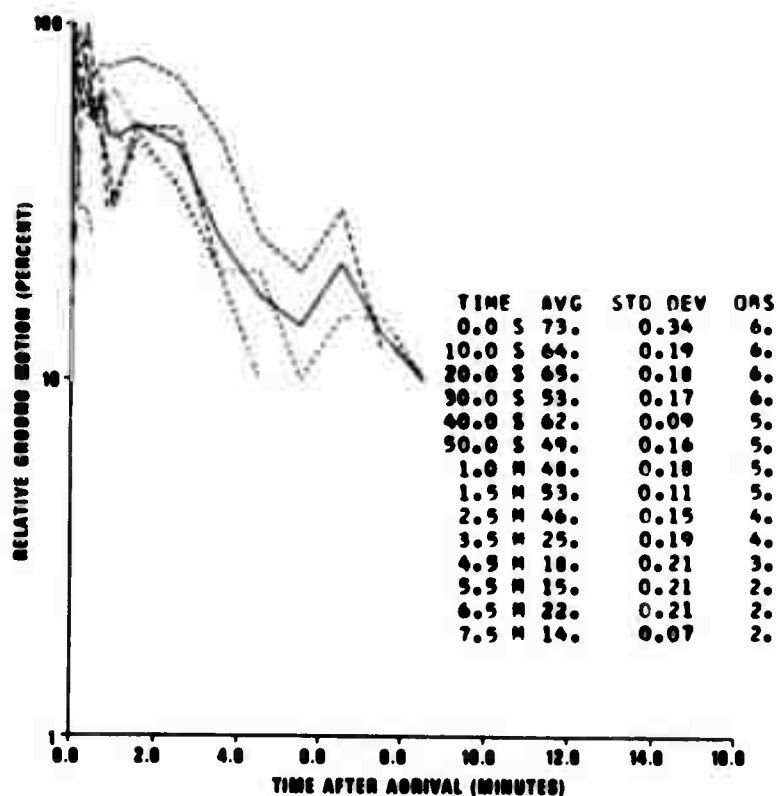


Figure 146. P coda characteristics, Philippine Islands-Taiwan, SEO.

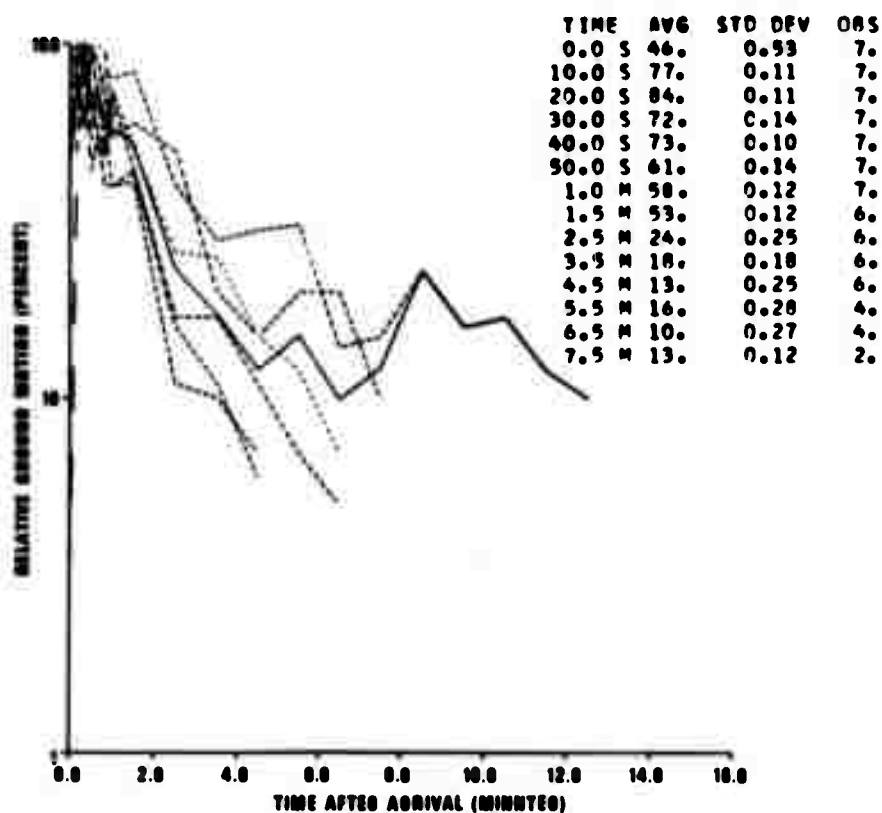


Figure 147. P coda characteristics, Philippine Islands-Taiwan, SHI.

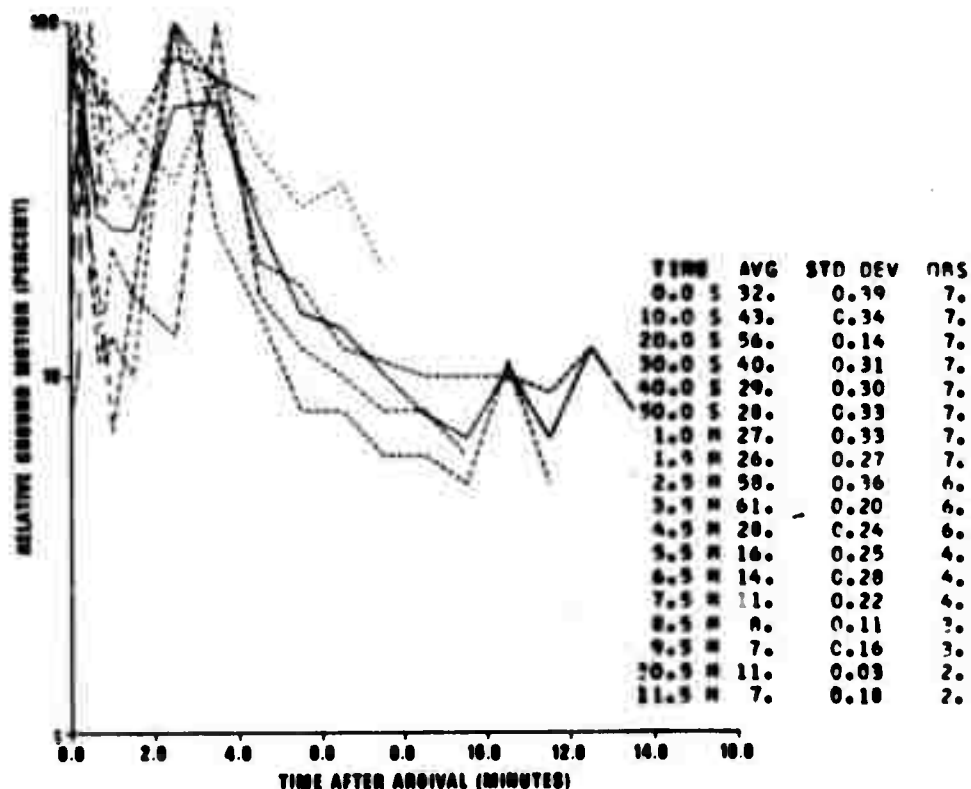


Figure 148. PKP coda characteristics, Philippine Islands-Taiwan, WES.

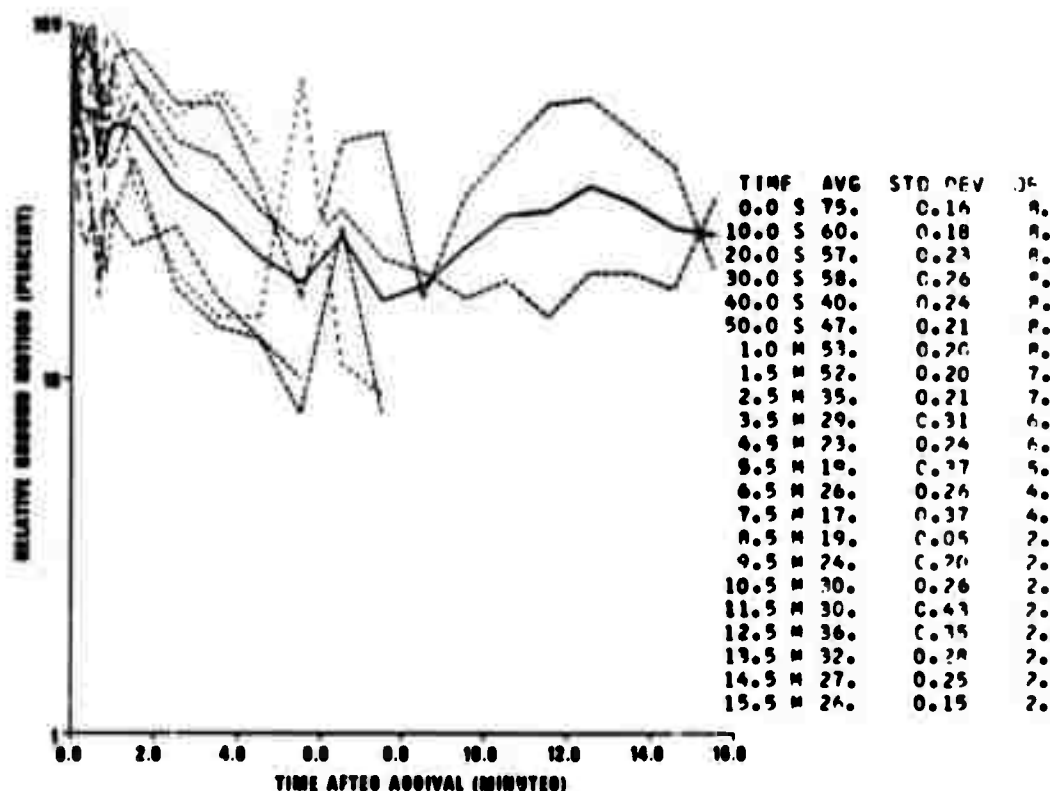


Figure 149. P coda characteristics, Solomon Islands-New Hebrides, ADE.

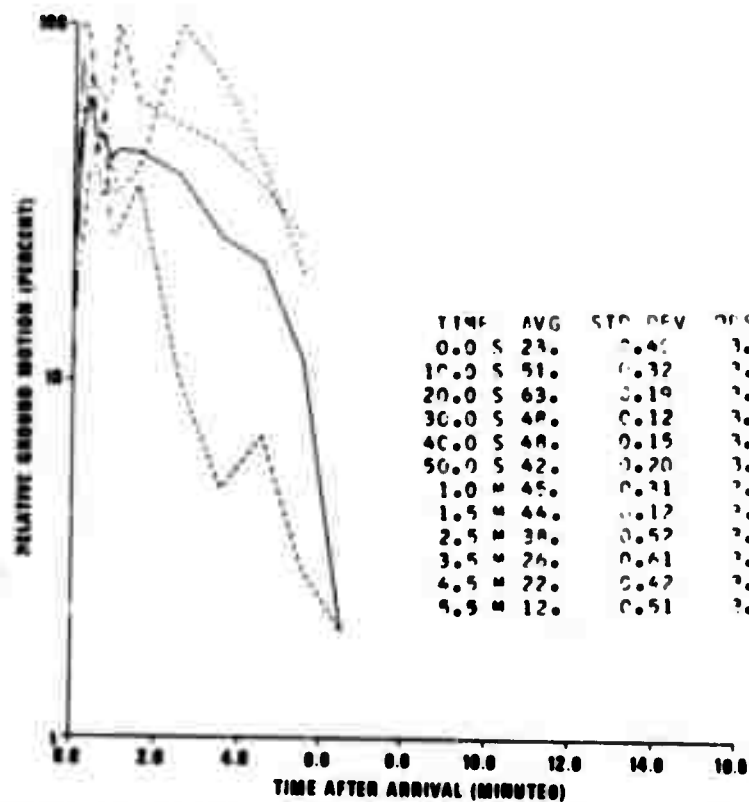


Figure 150. PKP coda characteristics, Solomon Islands-New Hebrides, AQU.

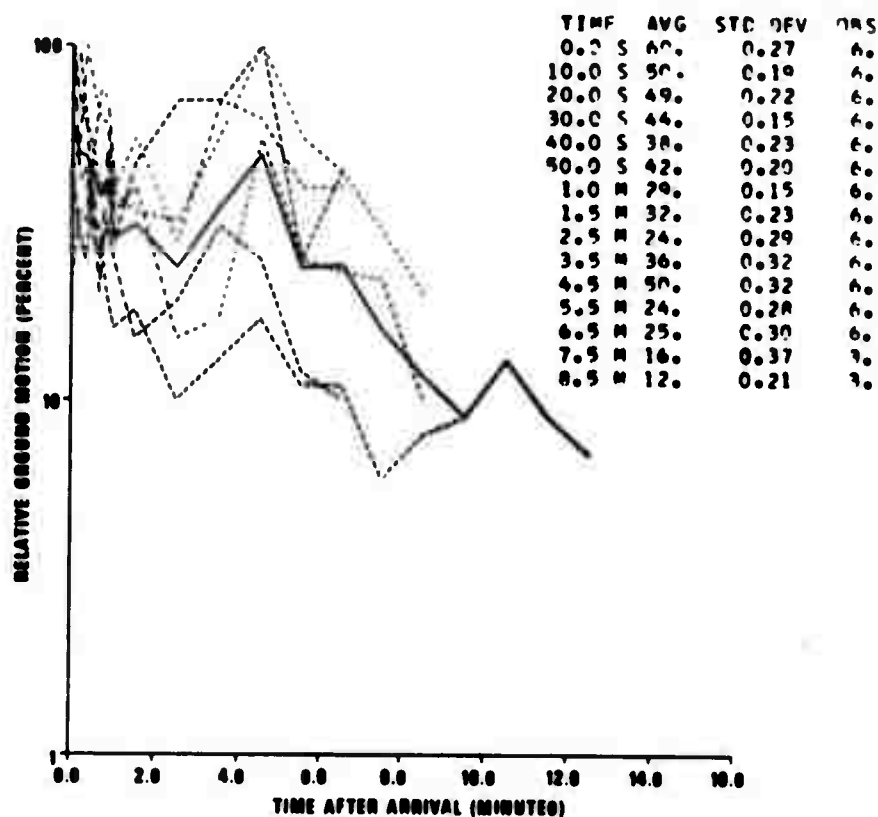


Figure 151. P coda characteristics, Solomon Islands-New Hebrides, B02.

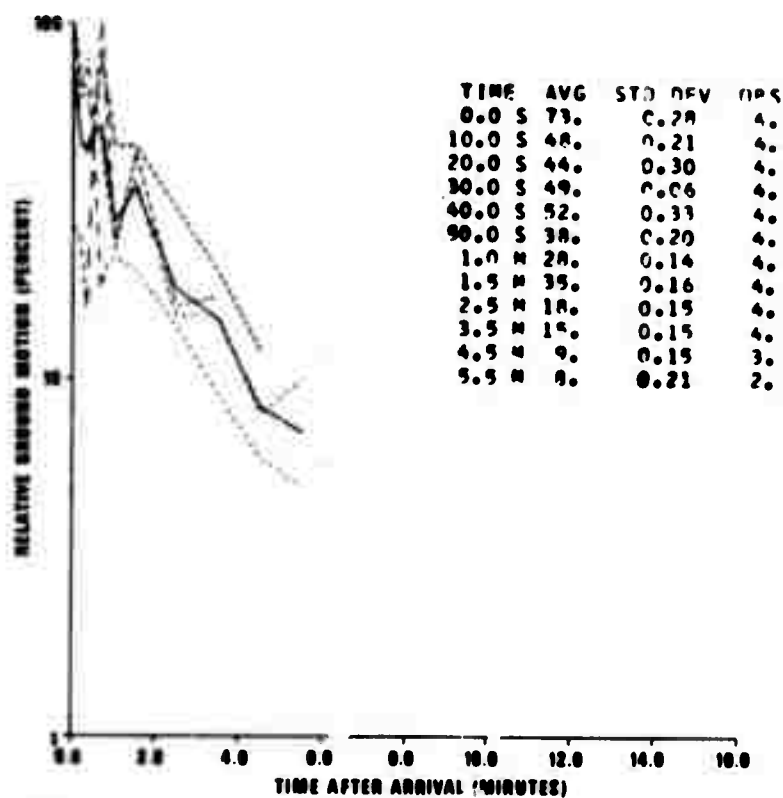


Figure 152. P coda characteristics, Solomon Islands-New Hebrides, CHG.

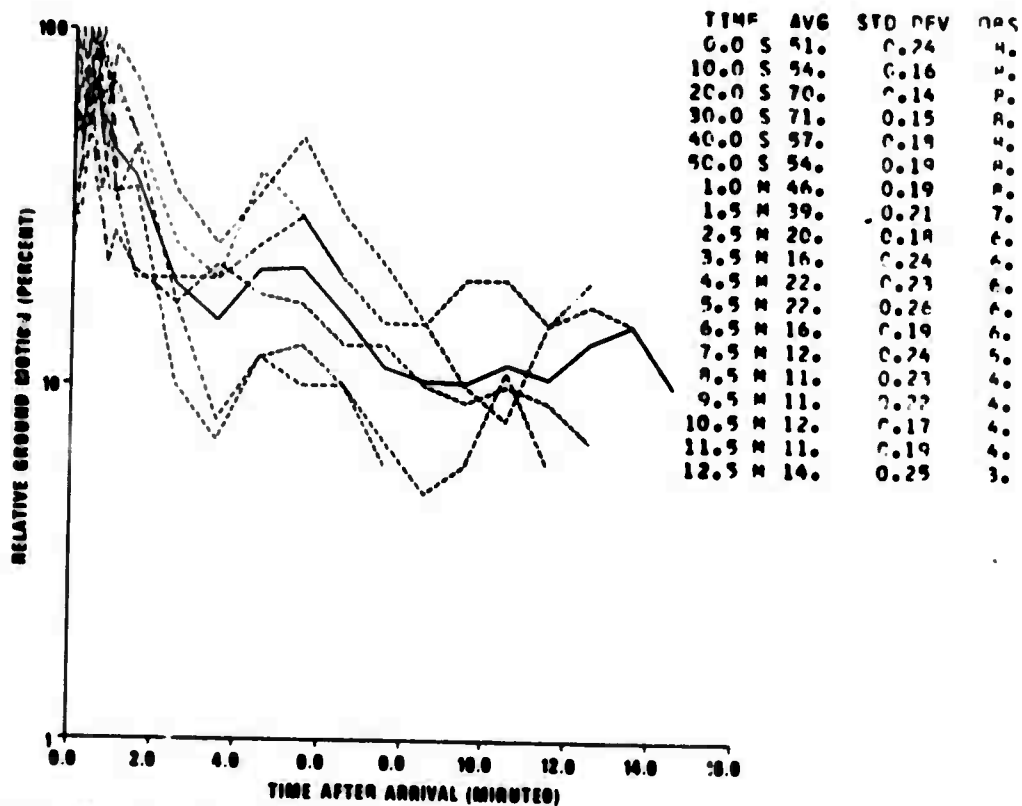


Figure 153. P coda characteristics, Solomon Islands-New Hebrides, CNC.

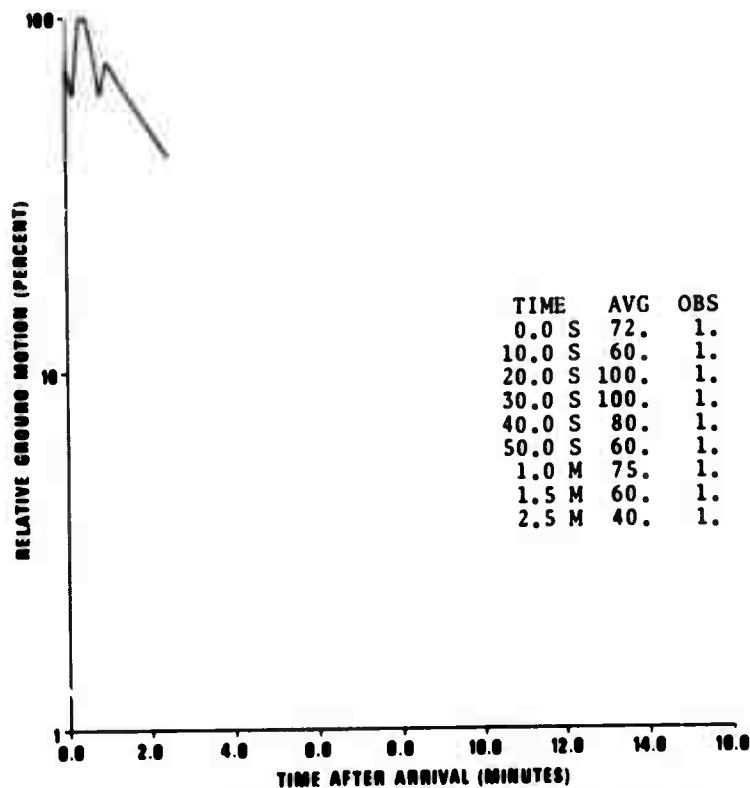


Figure 154. PKP coda characteristics, Solomon Islands-New Hebrides, DAL.

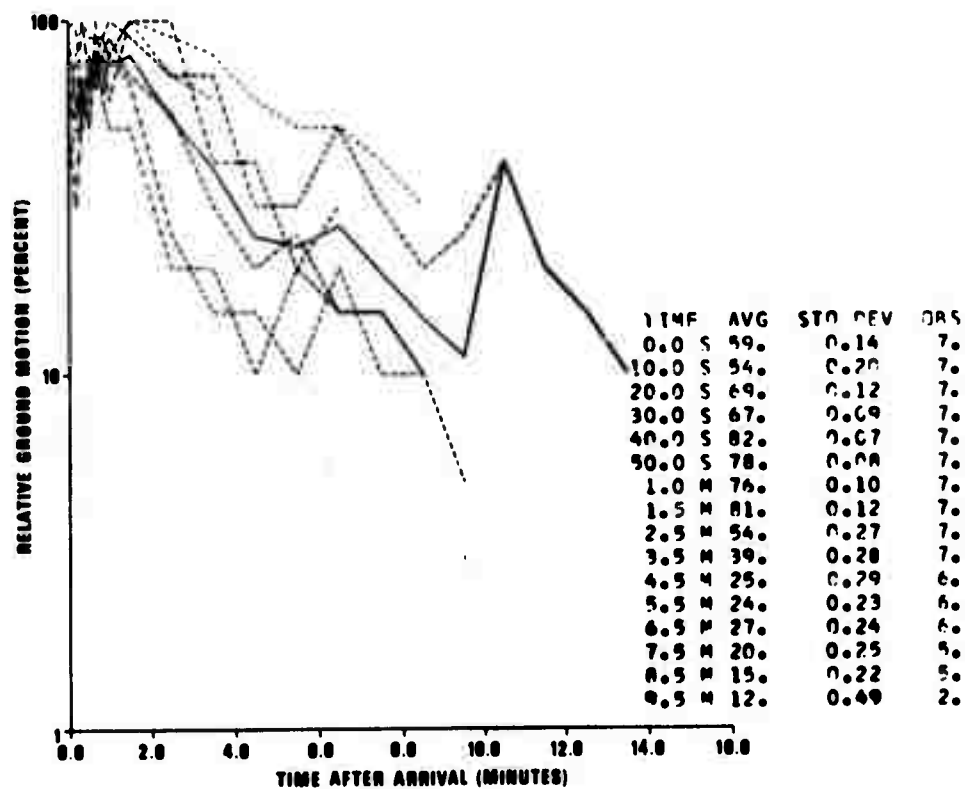


Figure 155. P coda characteristics, Solomon Islands-New Hebrides, DAV.

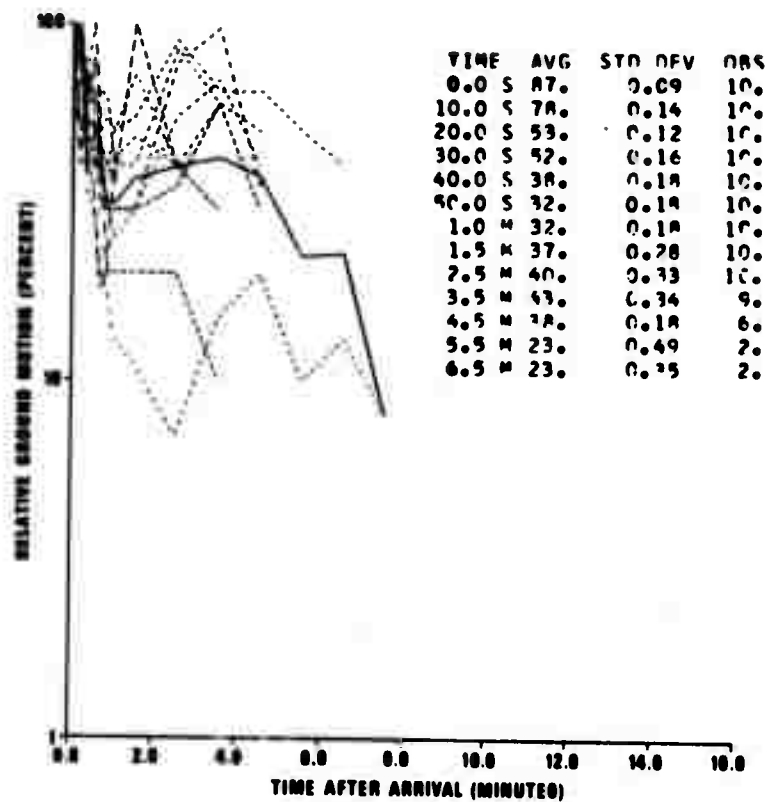


Figure 156. PKP coda characteristics, Solomon Islands-New Hebrides, IST.

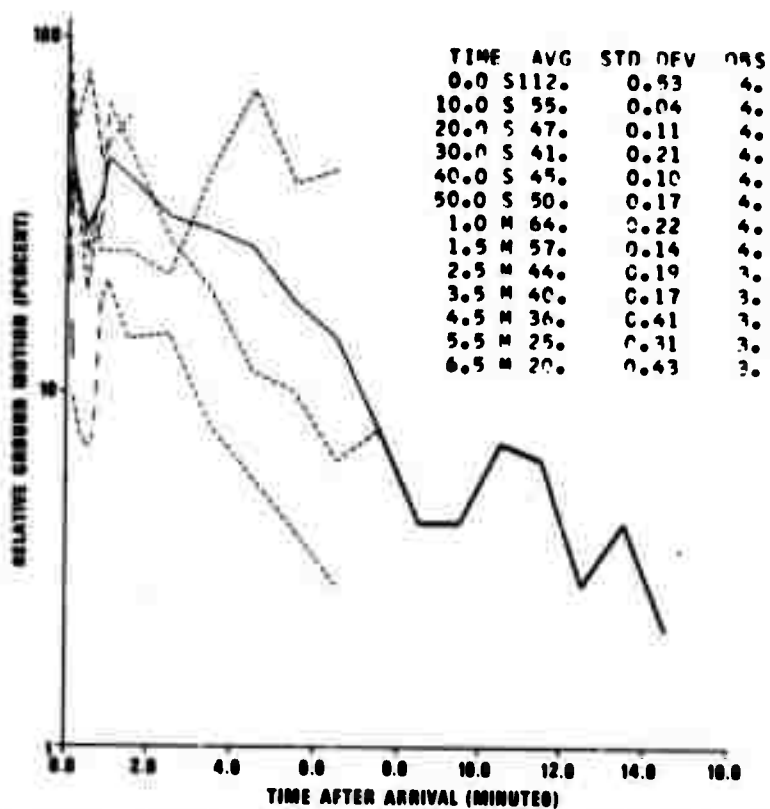


Figure 157. P coda characteristics, Solomon Islands-New Hebrides, KBL.

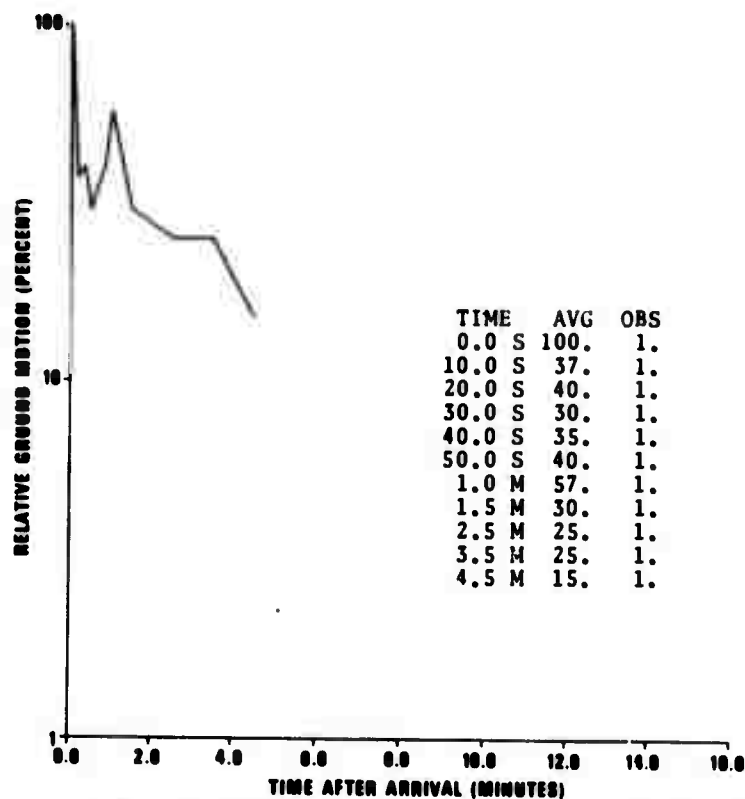


Figure 158. PKP coda characteristics, Solomon Islands-New Hebrides, KBL.

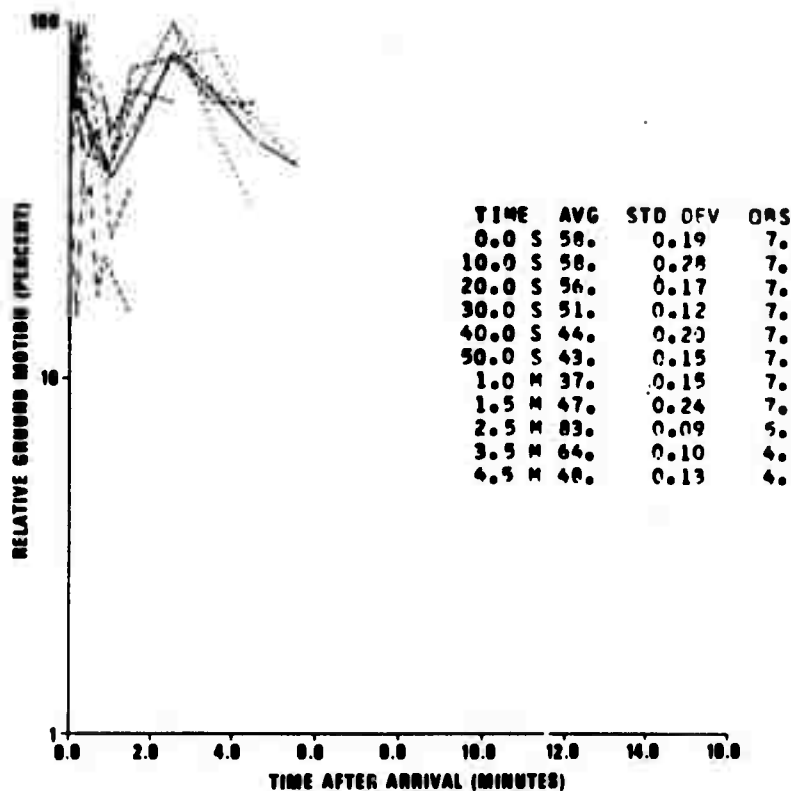


Figure 159. PKP coda characteristics, Solomon Islands-New Hebrides, KON.

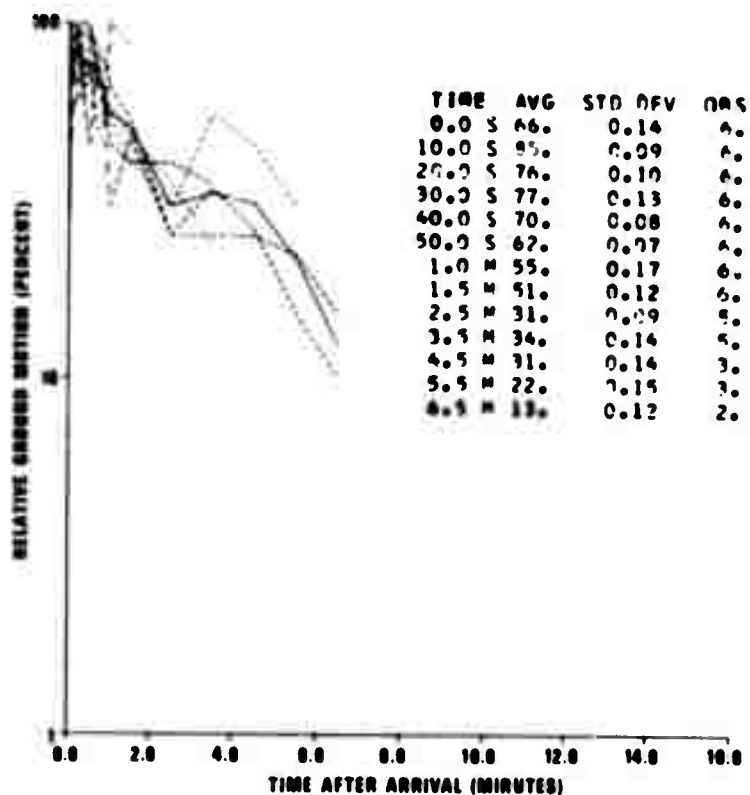


Figure 160. PKP coda characteristics, Solomon Islands-New Hebrides, MAL.

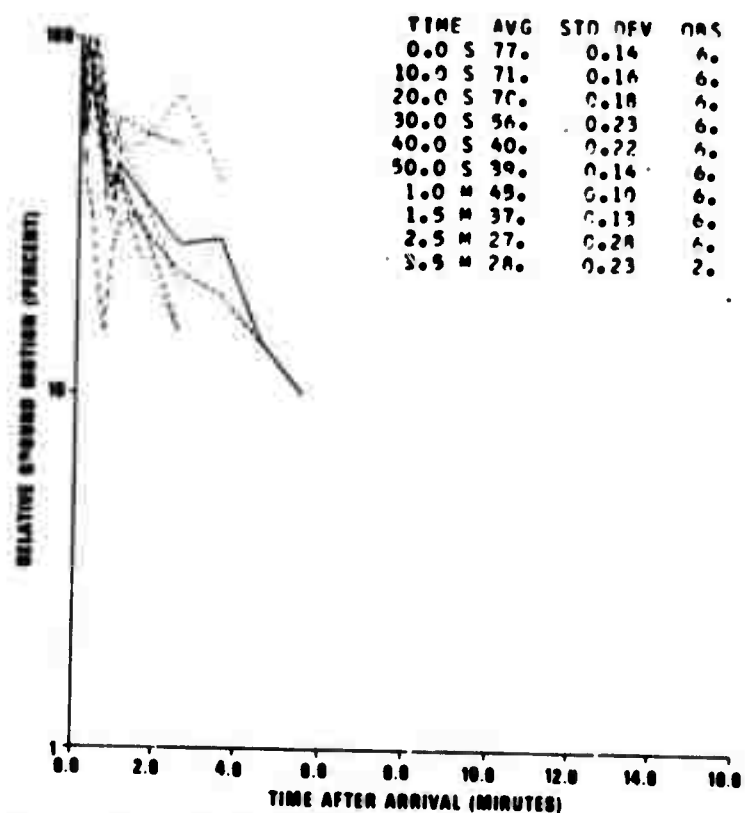


Figure 161. P coda characteristics, Solomon Islands-New Hebrides, MAT.

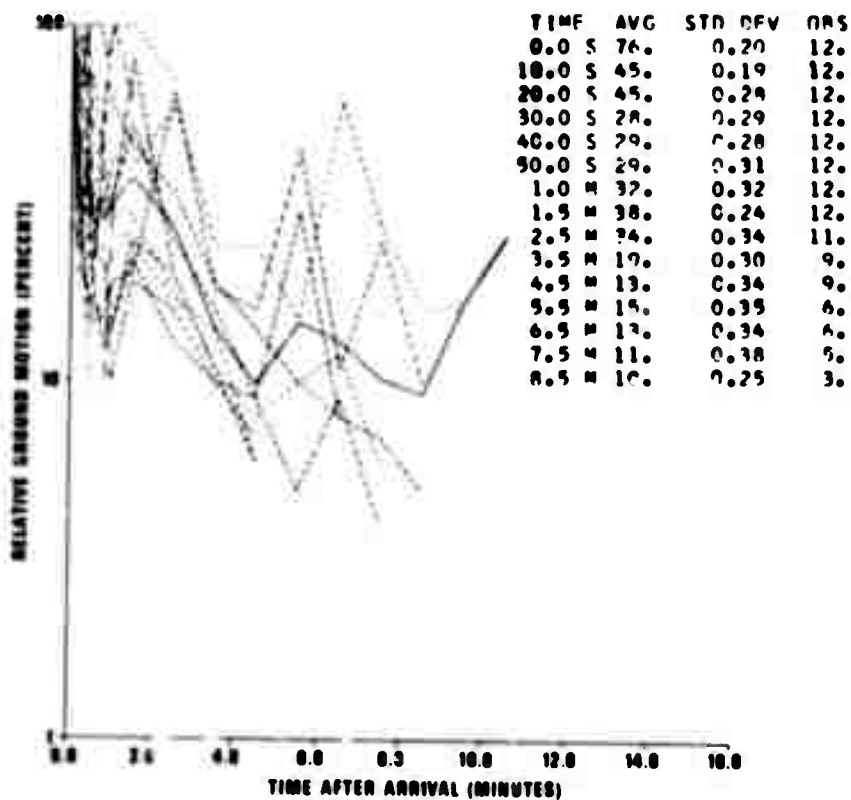


Figure 162. P coda characteristics, Solomon Islands-New Hebrides, MUN.

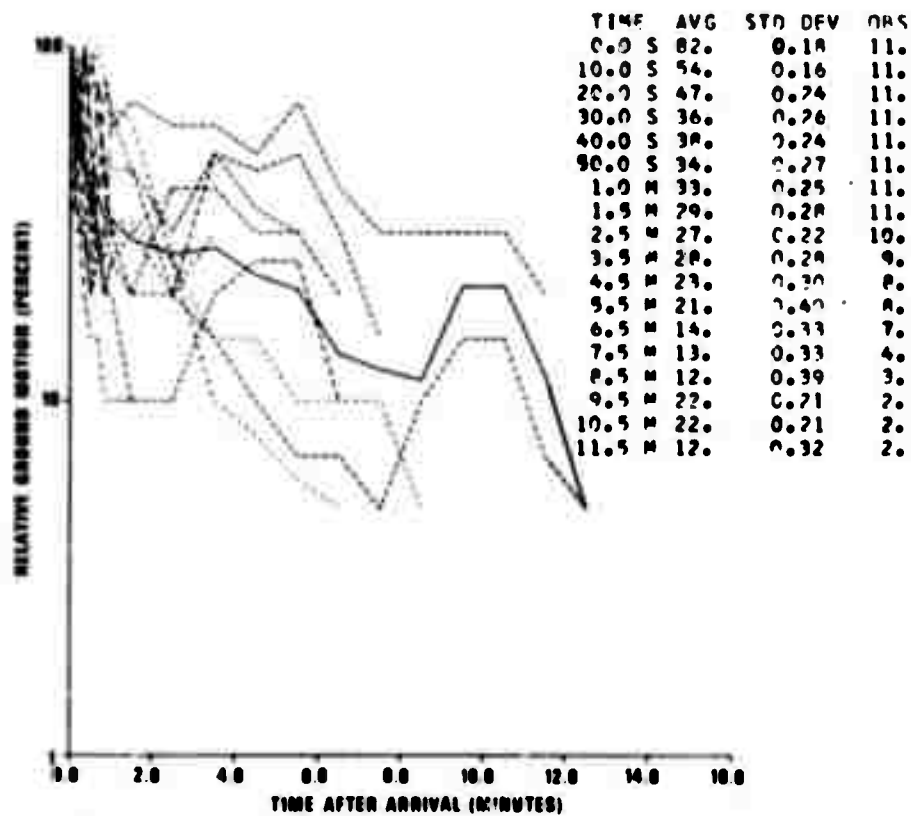


Figure 163. P coda characteristics, Solomon Islands-New Hebrides, NDI.

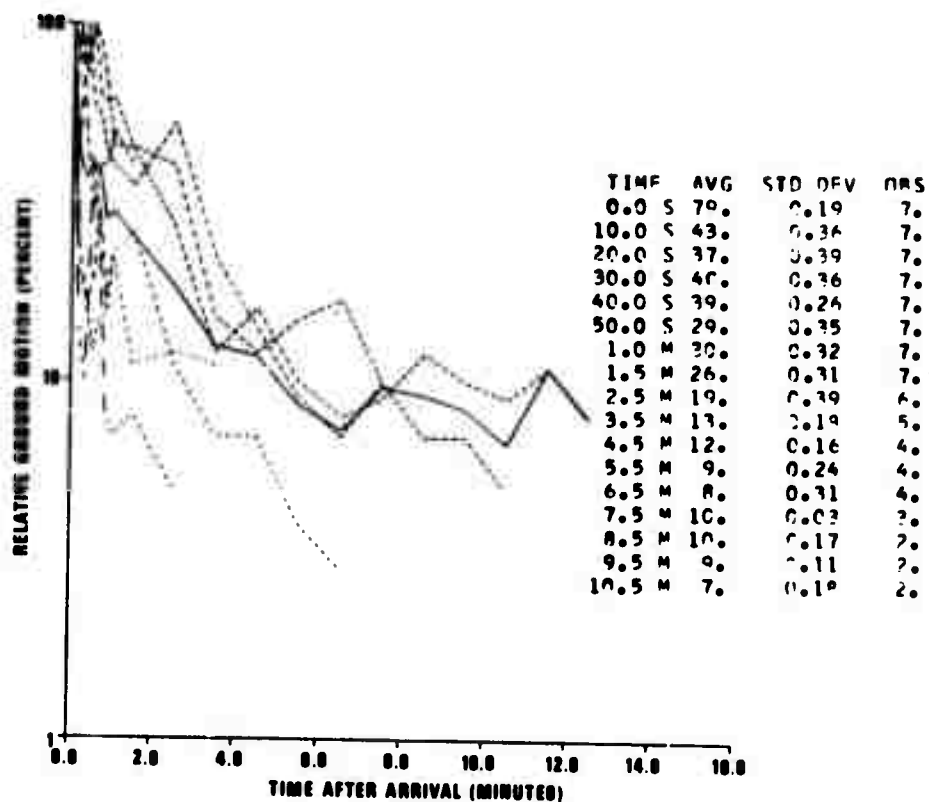


Figure 164. P coda characteristics, Solomon Islands-New Hebrides, SEO.

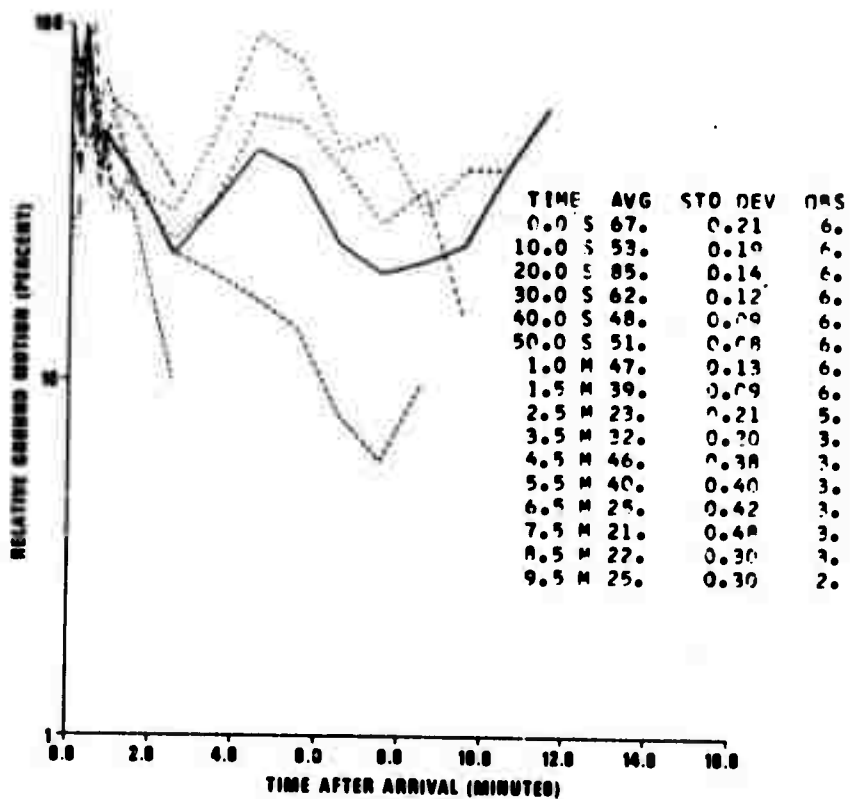


Figure 165. P coda characteristics, Solomon Islands-New Hebrides, SHI.

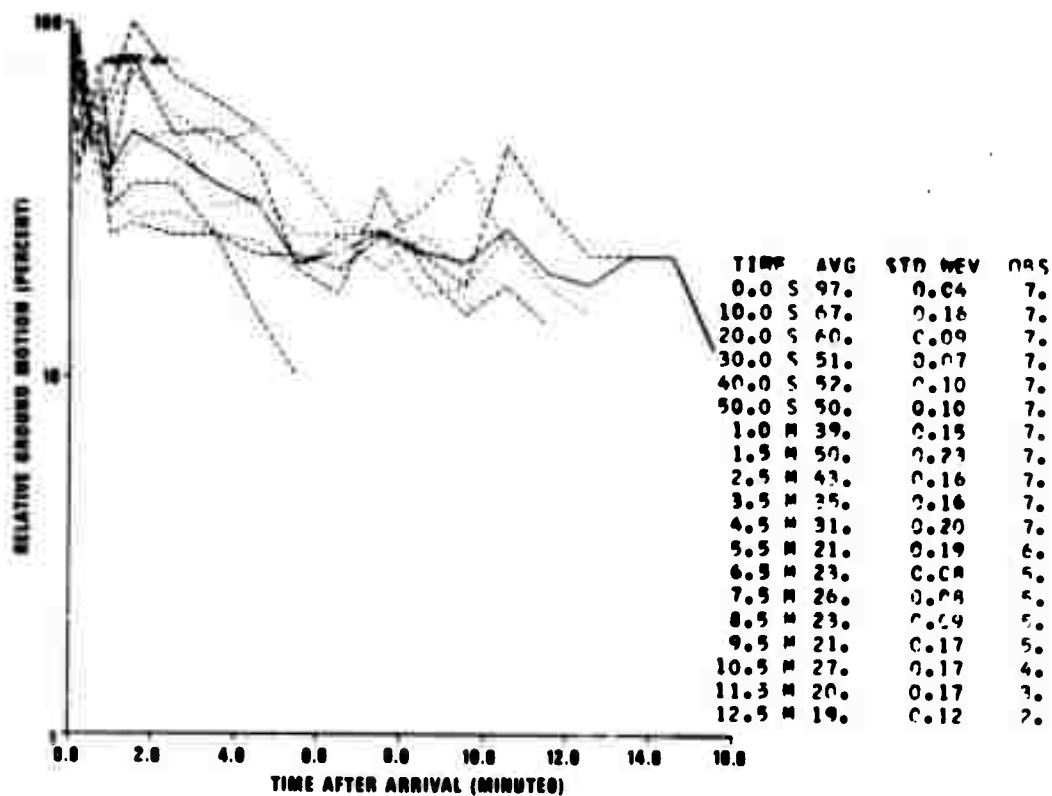


Figure 166. PKP coda characteristics, Solomon Islands-New Hebrides, SHI.

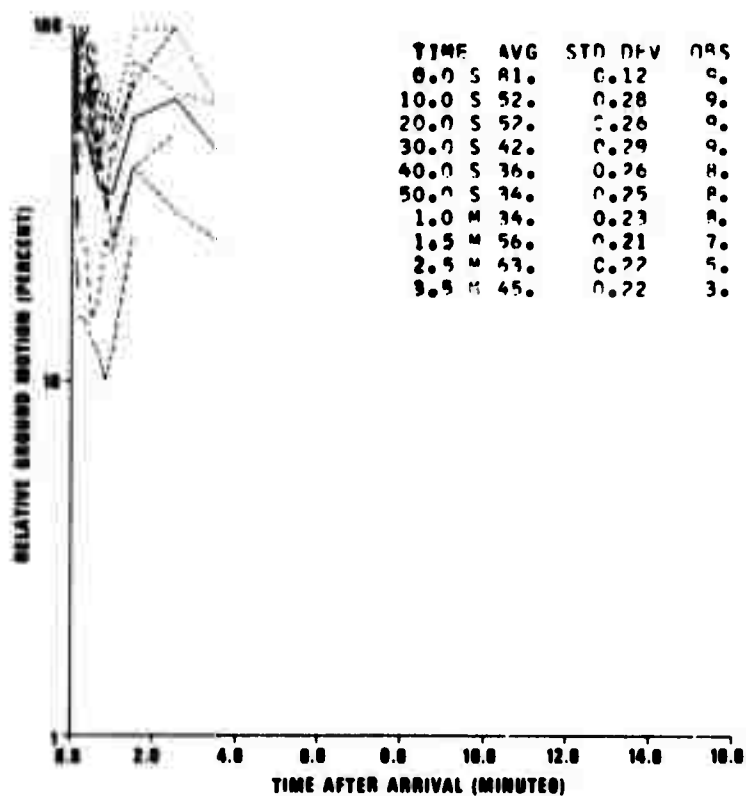


Figure 167. PKP coda characteristics, Solomon Islands-New Hebrides, WES.

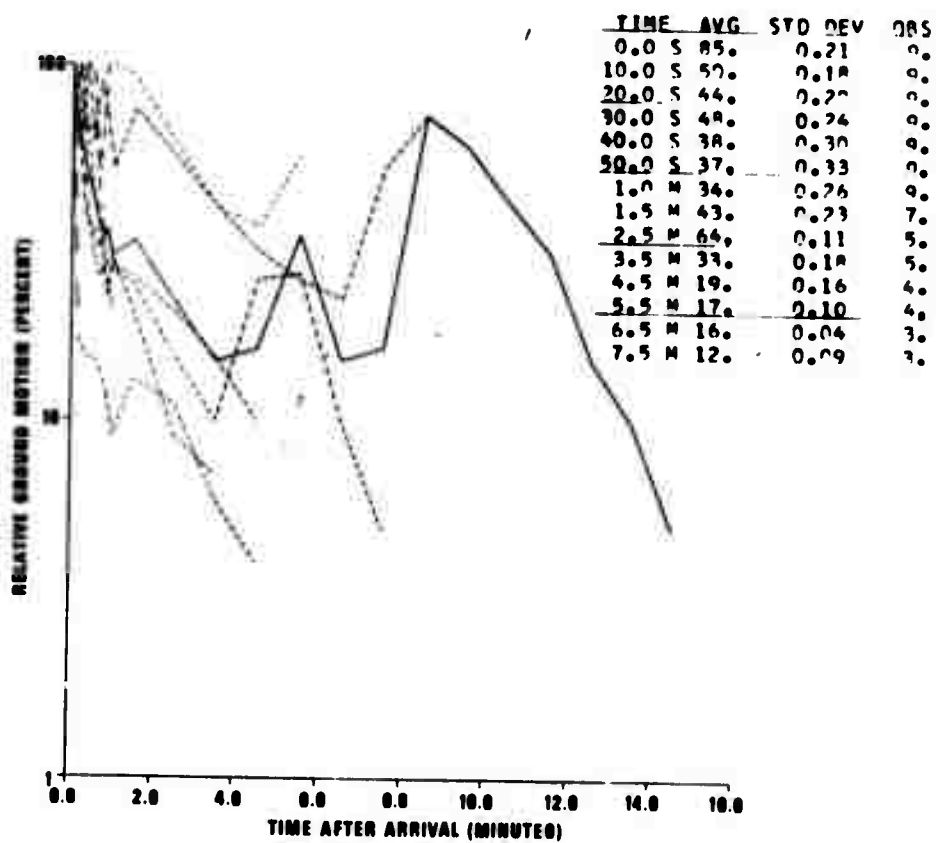


Figure 168. P coda characteristics, Sumatra-Java, ADE.

Figure 169. No observations, Sumatra-Java, AQU.

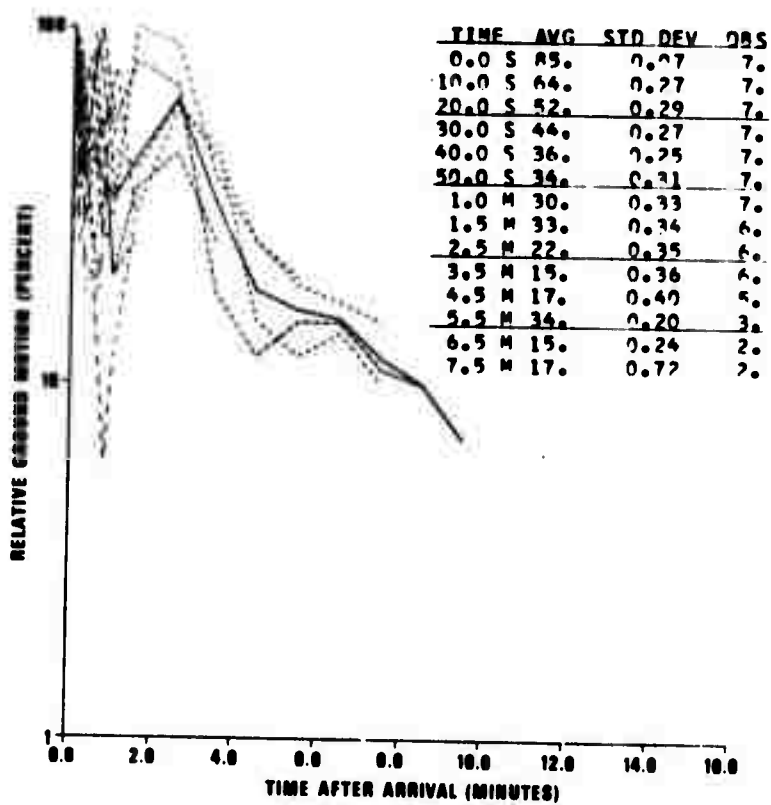


Figure 170. PKP coda characteristics, Sumatra-Java, BOZ.

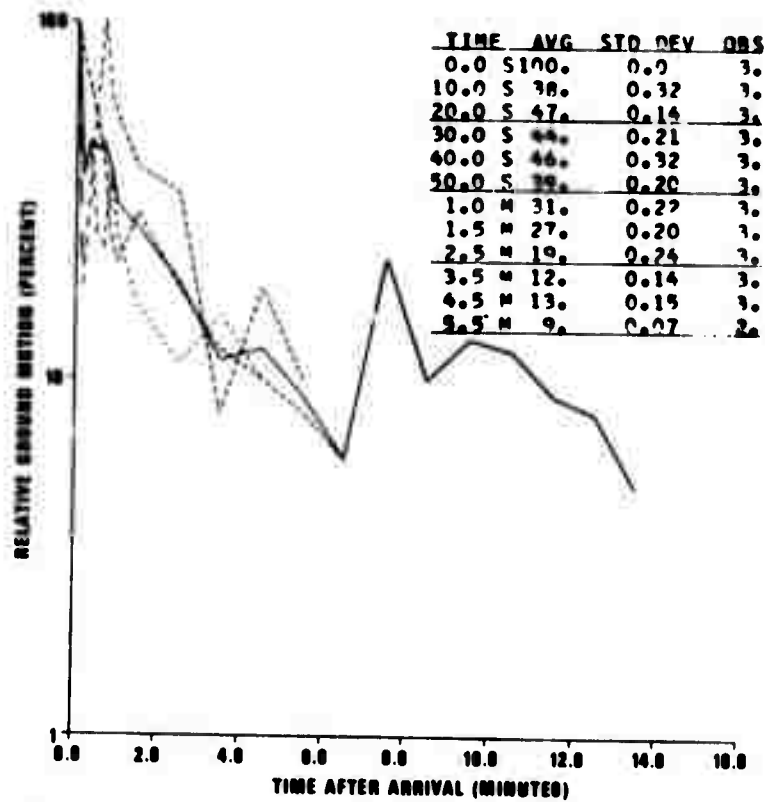


Figure 171. P coda characteristics, Sumatra-Java, CHG.

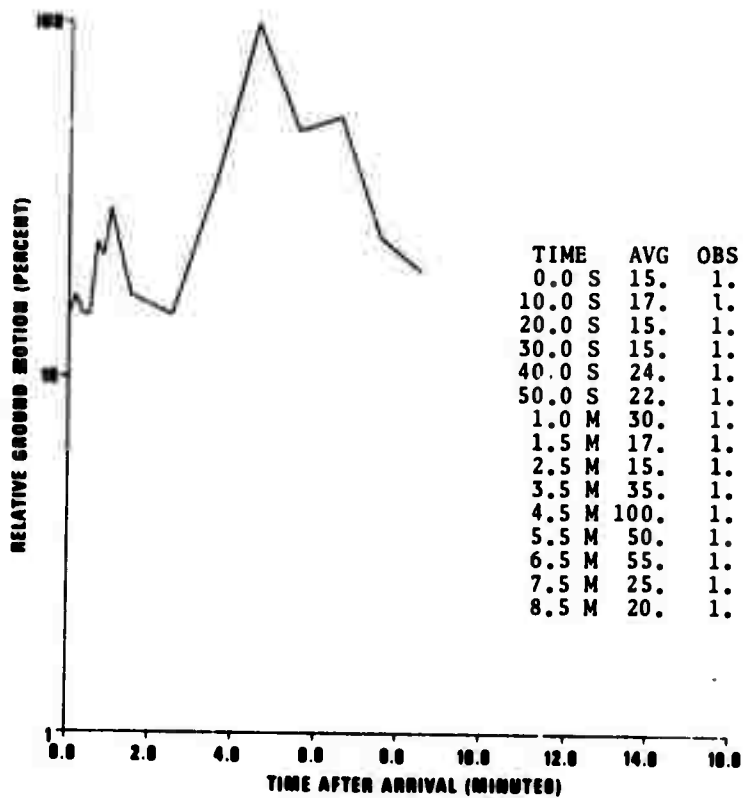


Figure 172. P coda characteristics, Sumatra-Java, CMC.

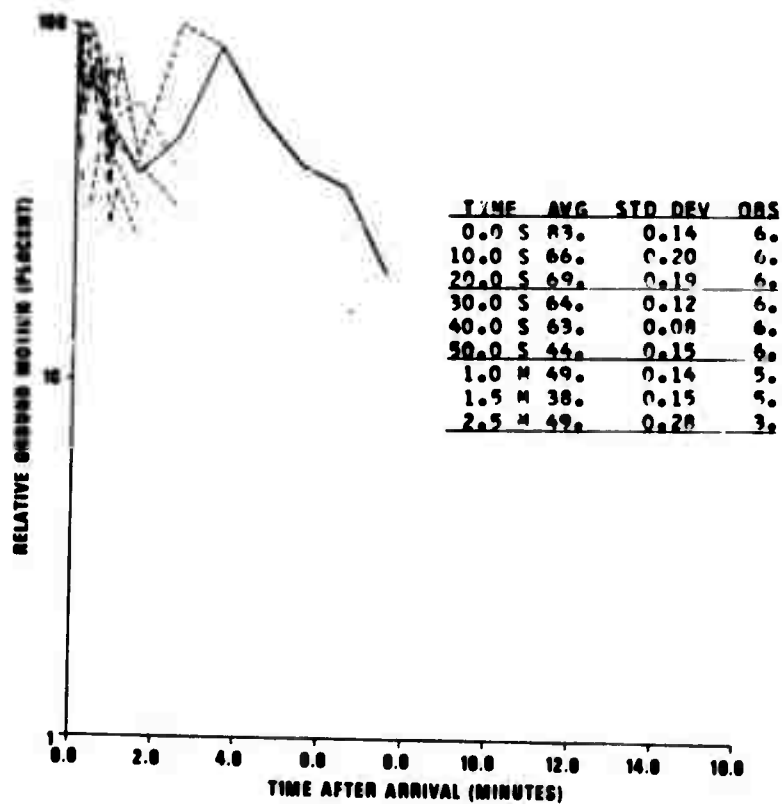


Figure 173. PKP coda characteristics, Sumatra-Java, CMC.

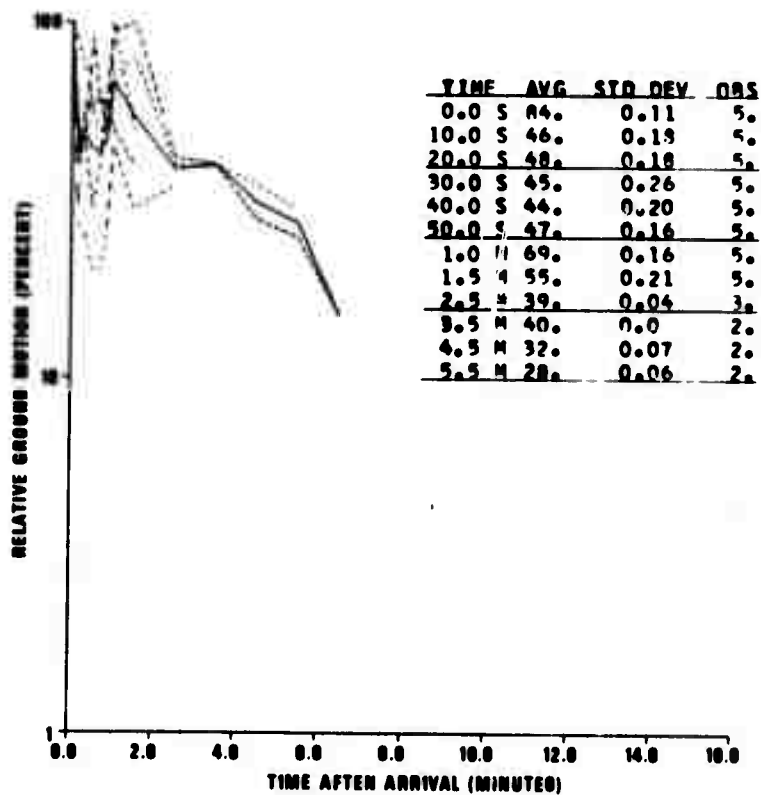


Figure 174. PKP coda characteristics, Sumatra-Java, DAL.

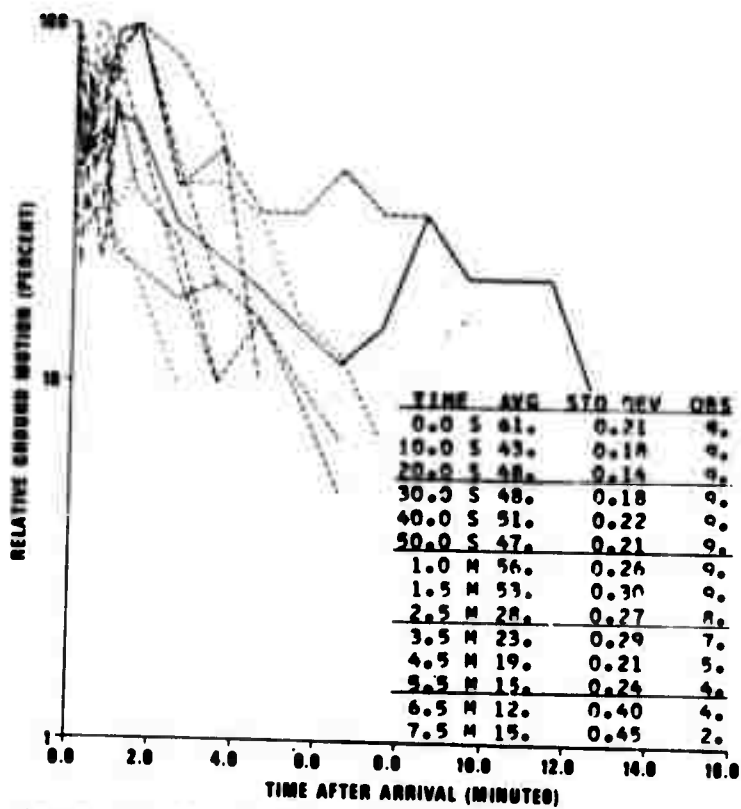


Figure 175. P coda characteristics, Sumatra-Java, DAV.

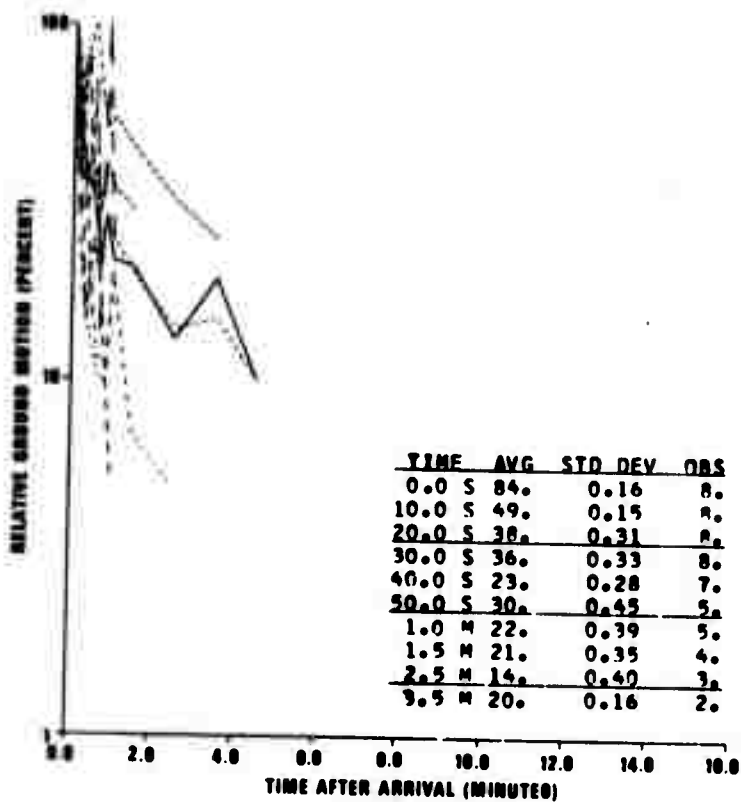


Figure 176. P coda characteristics, Sumatra-Java, IST.

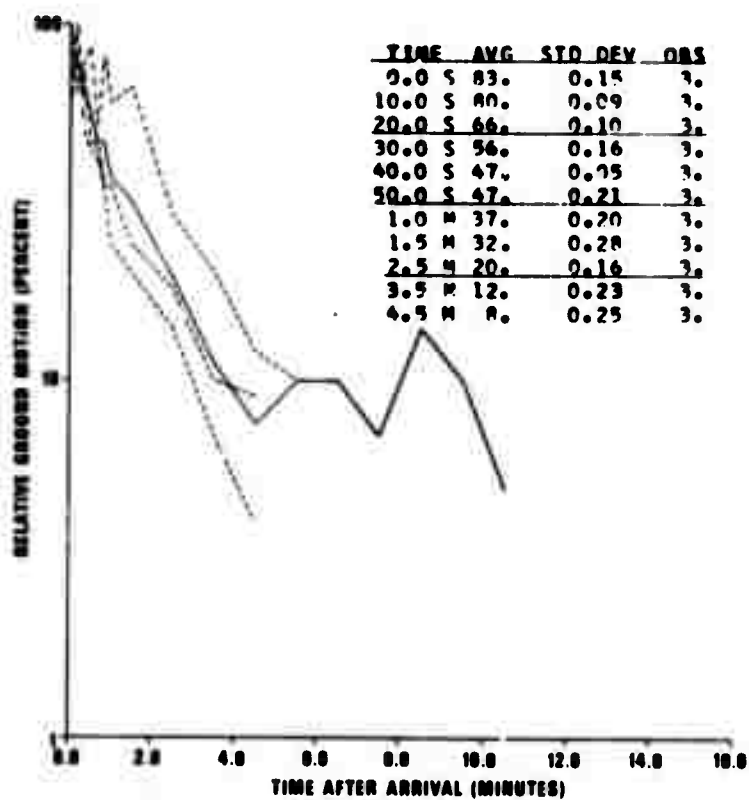


Figure 177. P coda characteristics, Sumatra-Java, KBC.

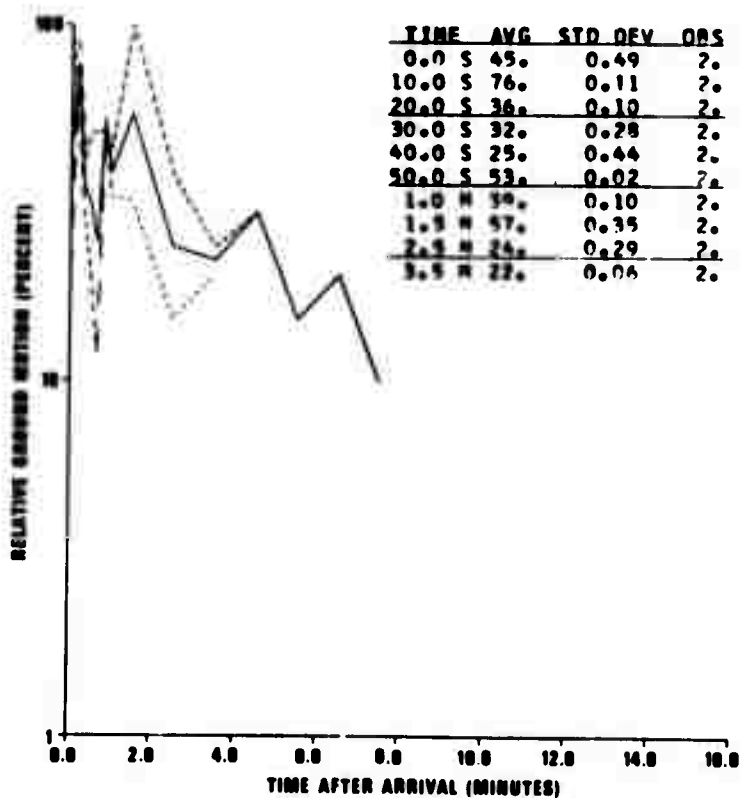


Figure 178. P coda characteristics, Sumatra-Java, KON.

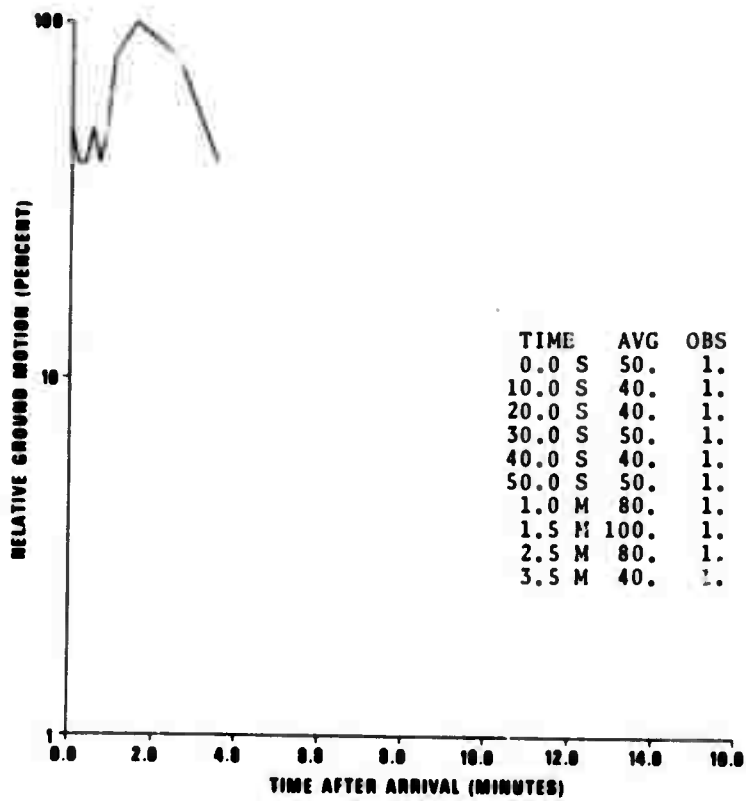


Figure 179. P coda characteristics, Sumatra-Java, MAL.

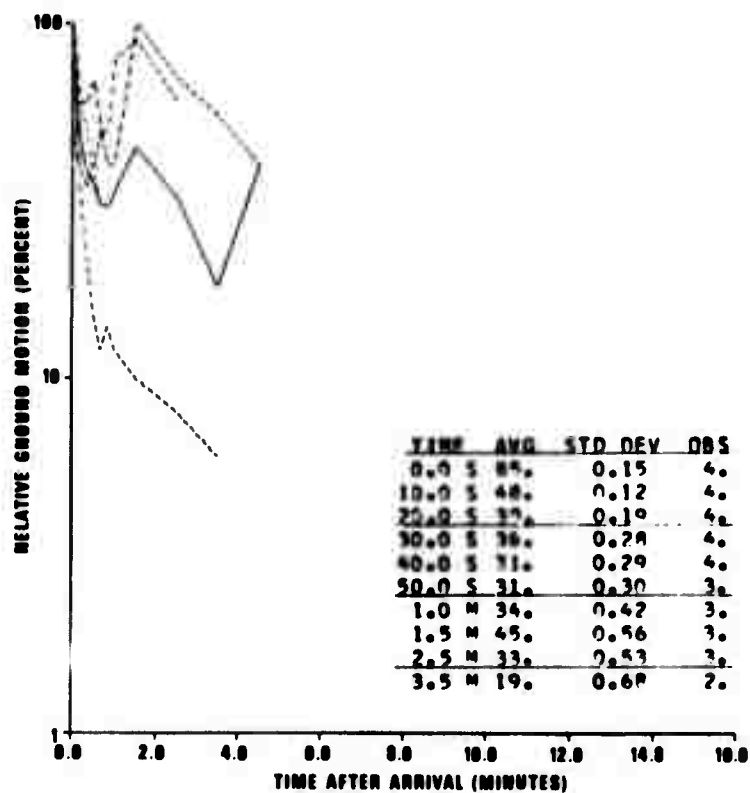


Figure 180. PKP coda characteristics, Sumatra-Java, MAL.

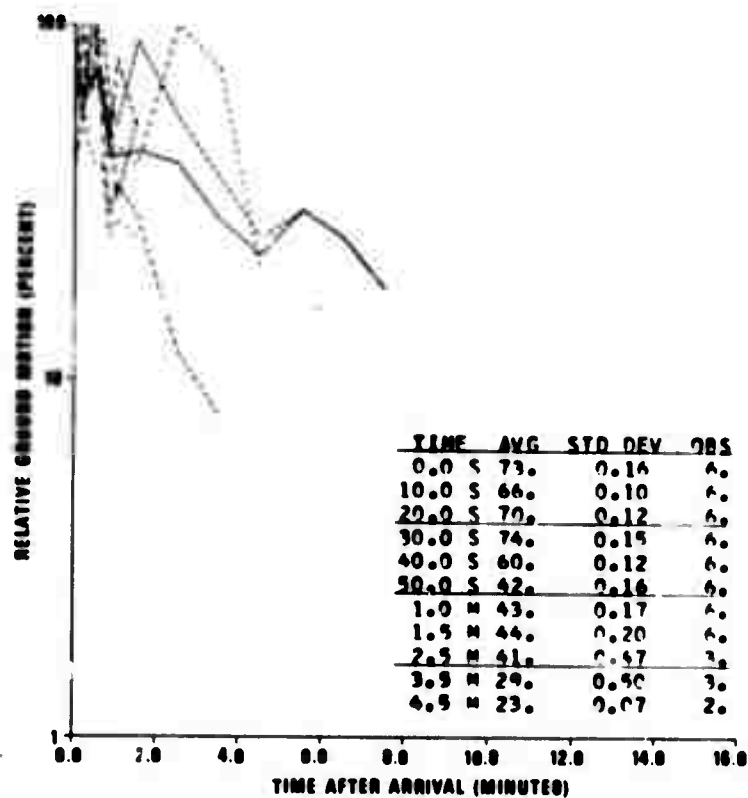


Figure 181. P coda characteristics, Sumatra-Java, MAT.

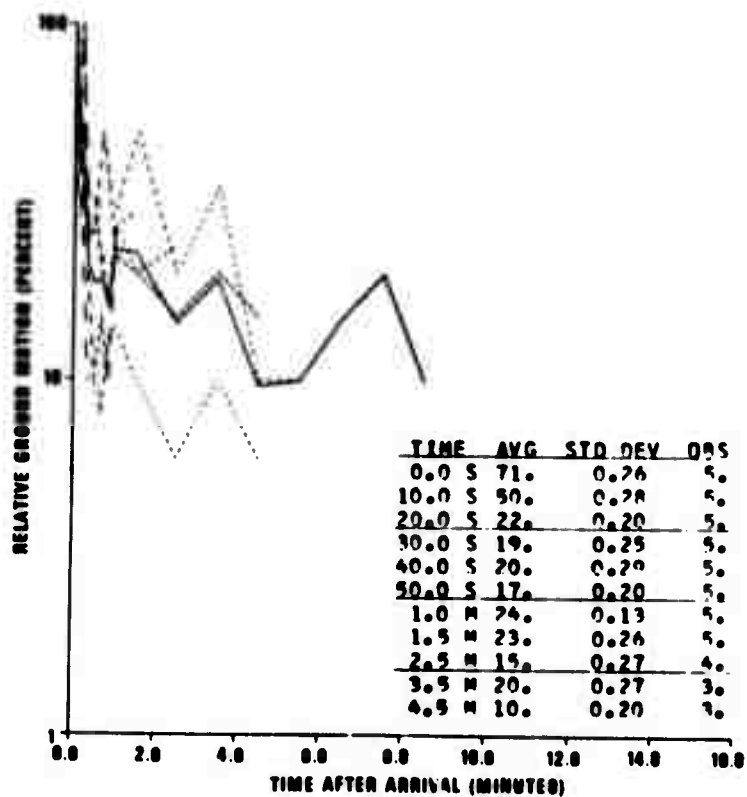


Figure 182. P coda characteristics, Sumatra-Java, MUN.

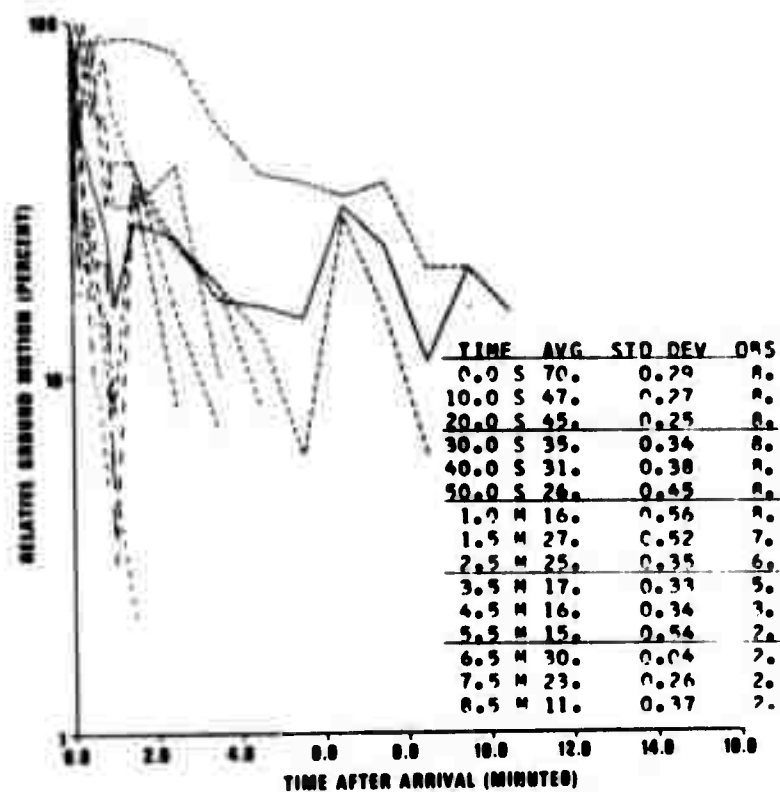


Figure 183. P coda characteristics, Sumatra-Java, NDI.

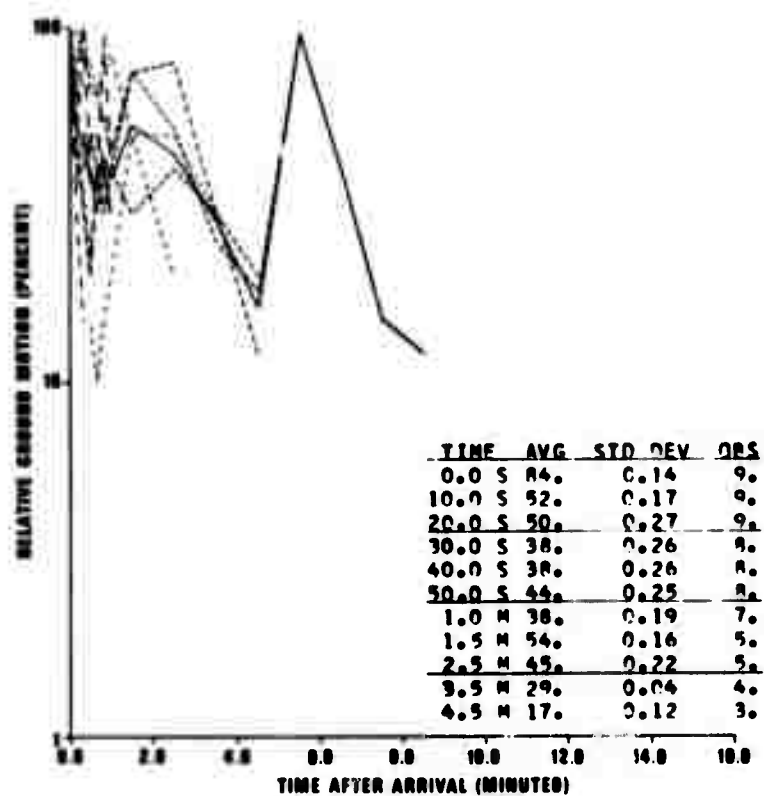


Figure 184. P coda characteristics, Sumatra-Java, SEO.

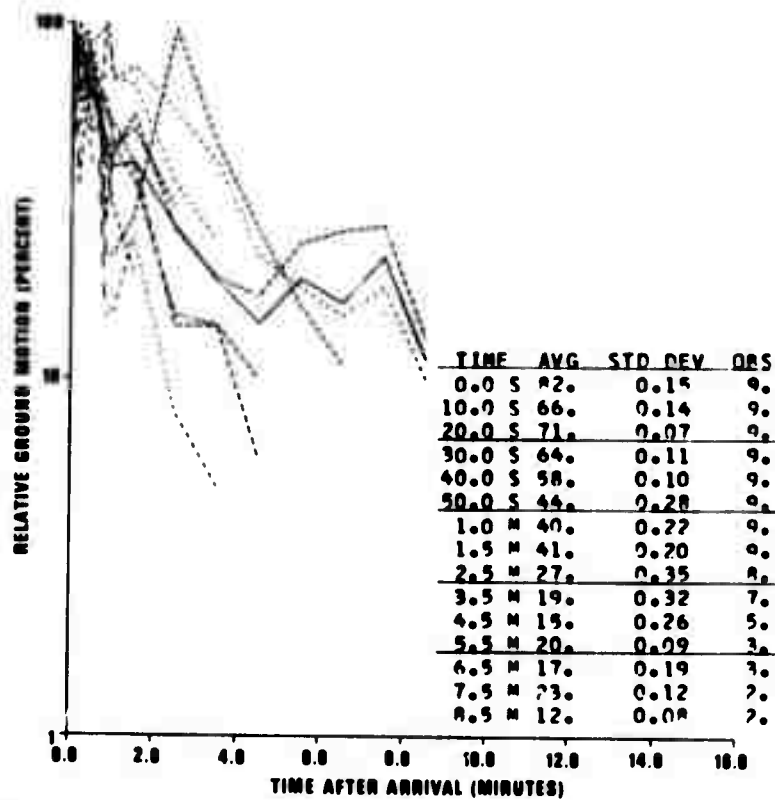


Figure 185. P coda characteristics, Sumatra-Java, SHI.

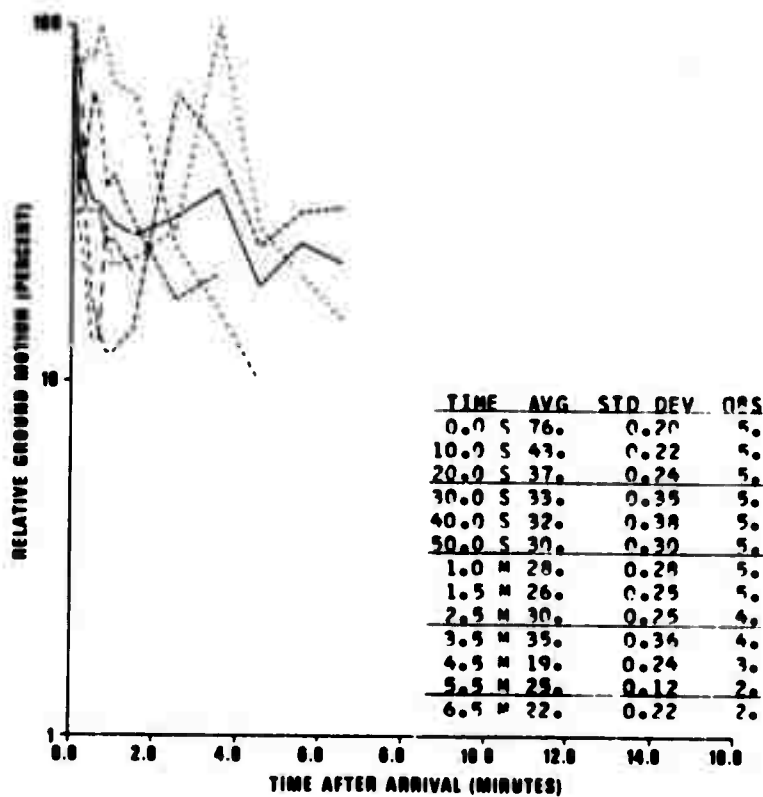


Figure 186. PKP coda characteristics, Sumatra-Java, WES.

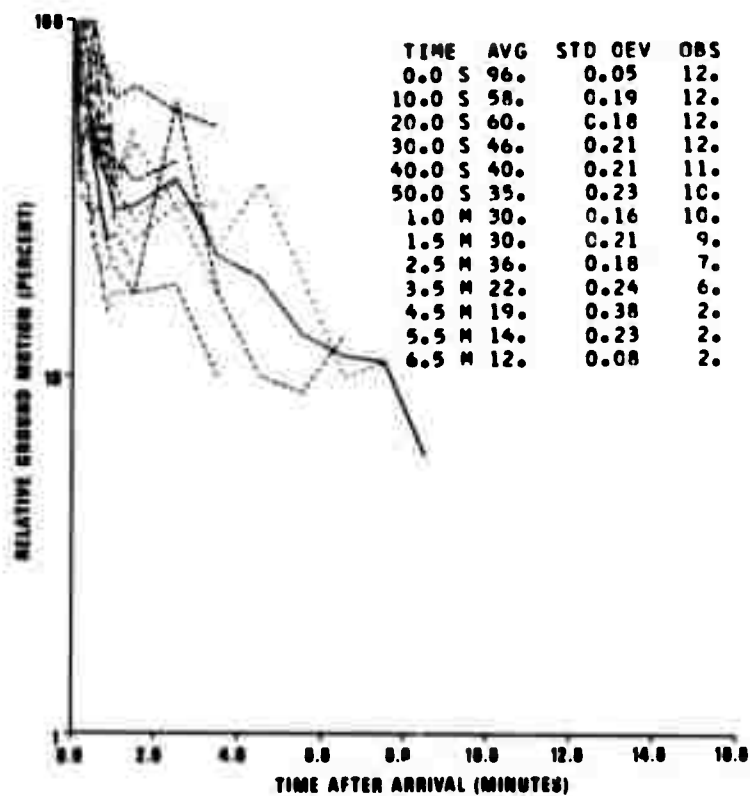


Figure 187. P coda characteristics, Tonga Islands-Fiji Islands, ADE.

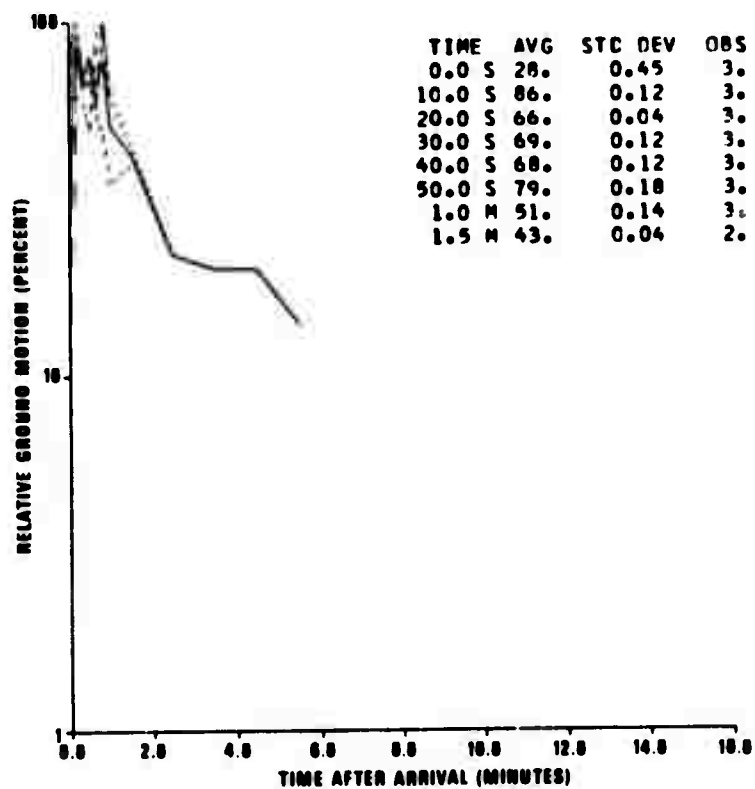


Figure 188. PKP coda characteristics, Tonga Islands-Fiji Islands, AQU.

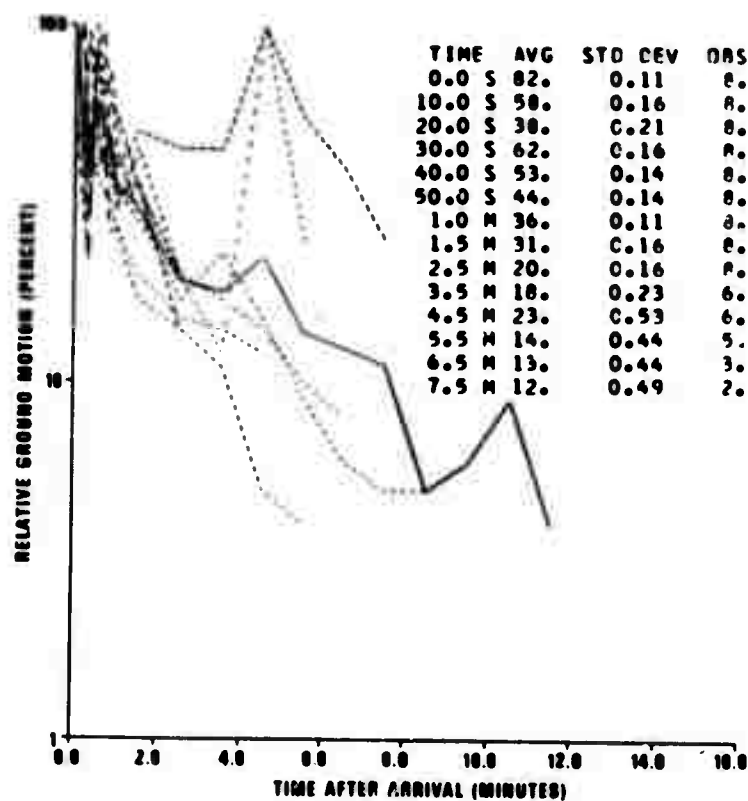


Figure 189. P coda characteristics, Tonga Islands-Fiji Islands, BOZ.

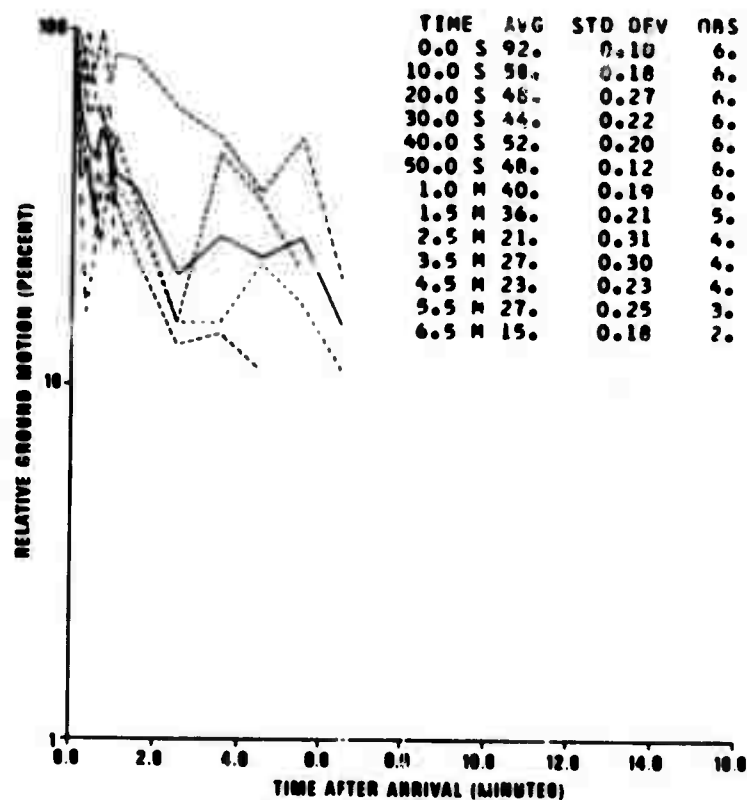


Figure 190. P coda characteristics, Tonga Islands-Fiji Islands, CHG.

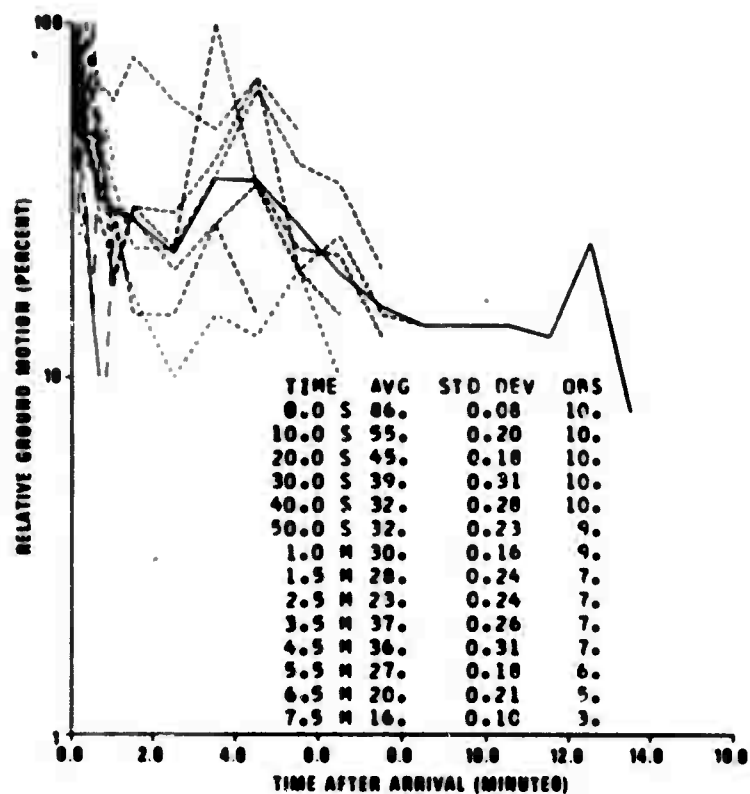


Figure 191. P coda characteristics, Tonga Islands-Fiji Islands, CMC.

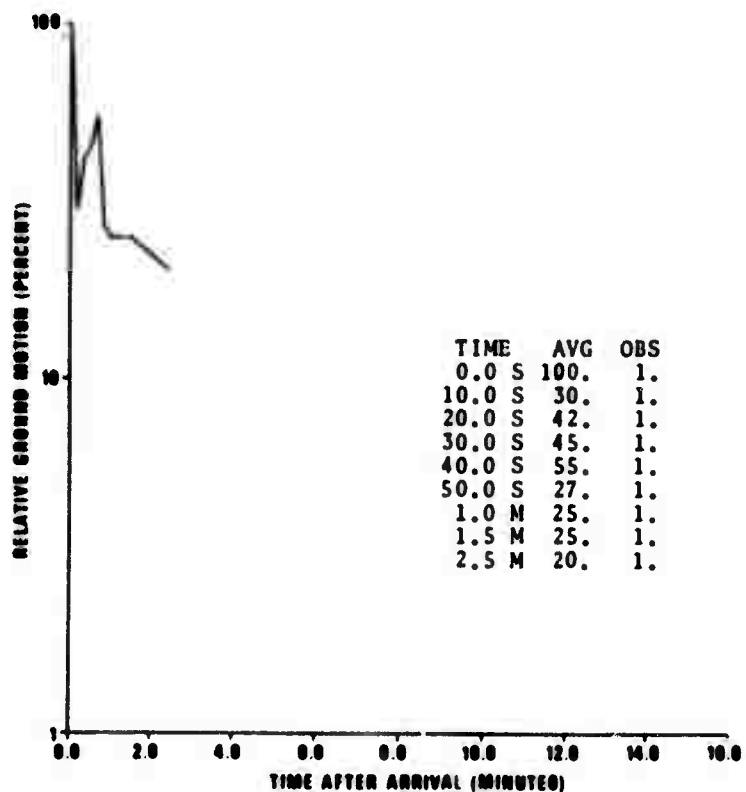


Figure 192. P coda characteristics, Tonga Islands-Fiji Islands, DAL.

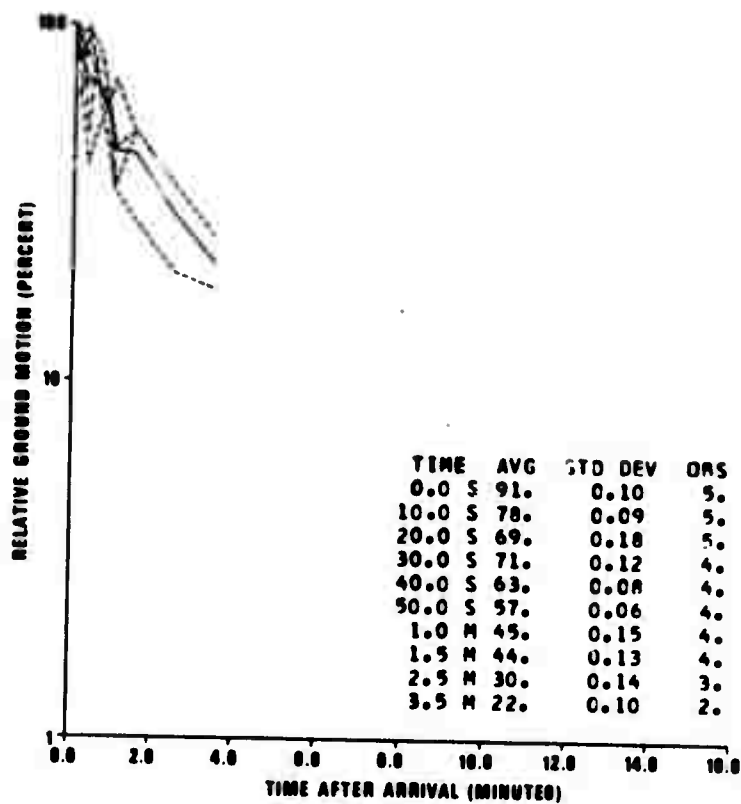


Figure 193. P coda characteristics, Tonga Islands-Fiji Islands, DAV.

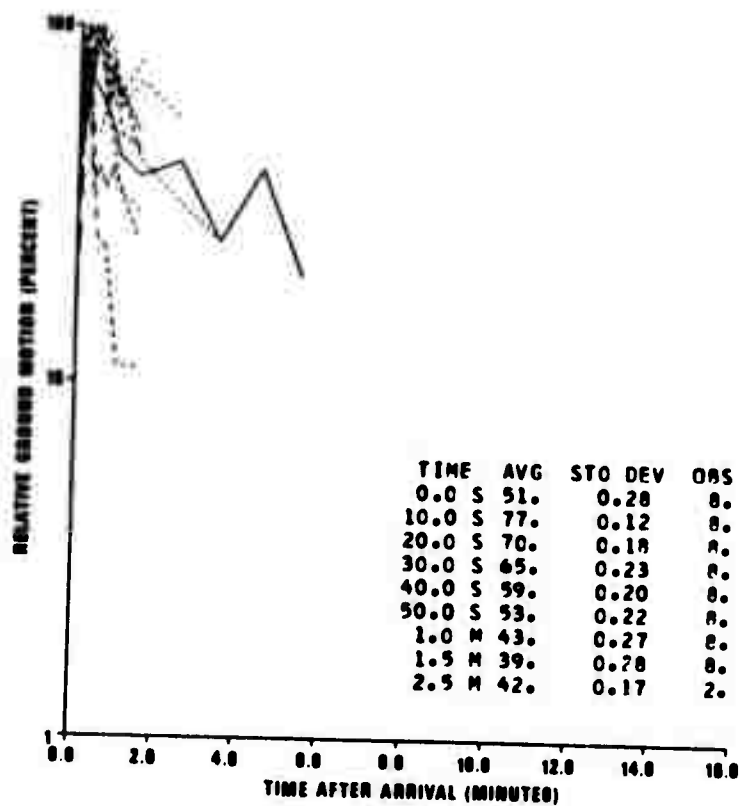


Figure 194. PKP coda characteristics, Tonga Islands-Fiji Islands, IST.

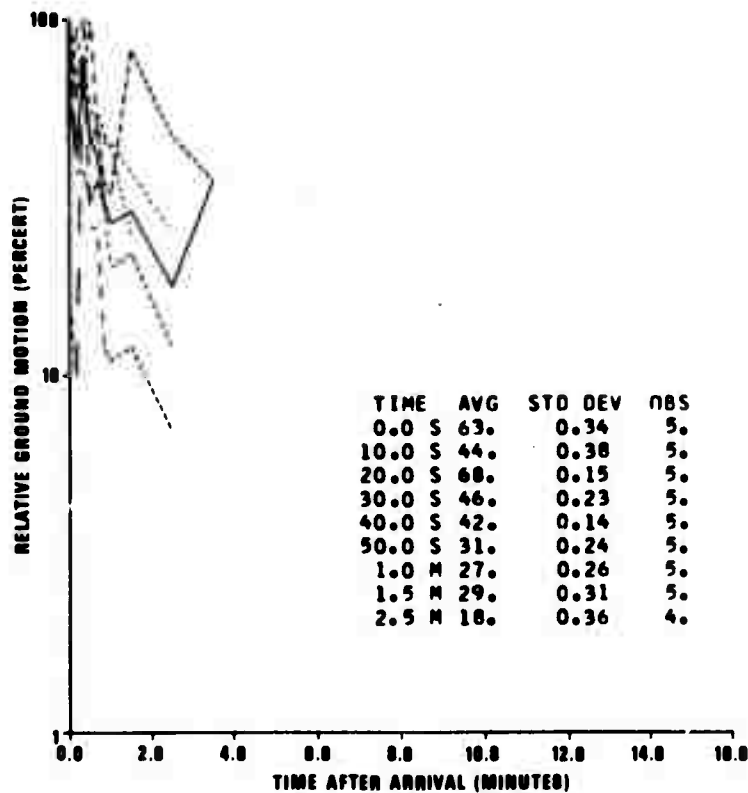


Figure 195. PKP coda characteristics, Tonga Islands-Fiji Islands, KBL.

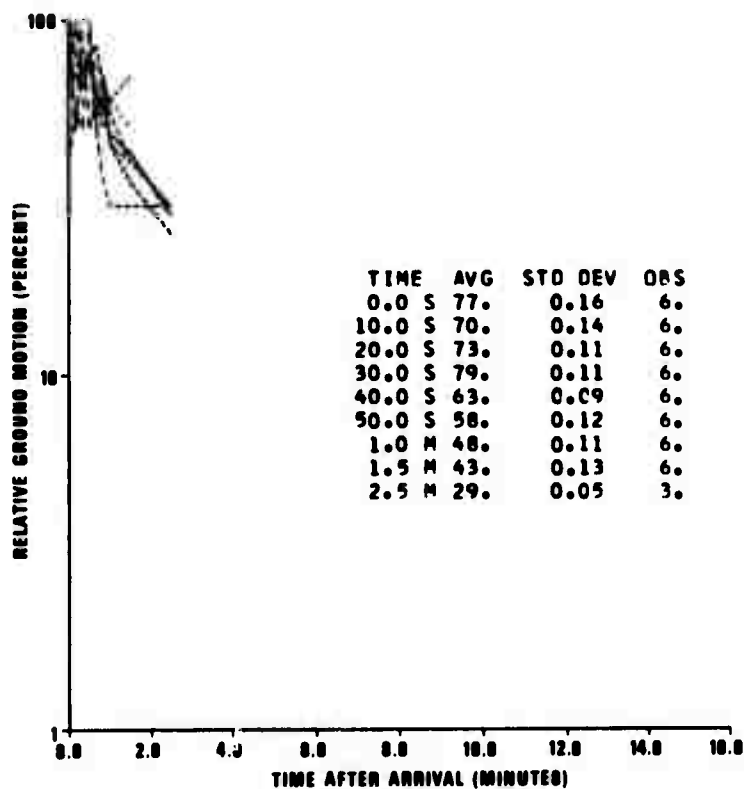


Figure 196. PKP coda characteristics, Tonga Islands-Fiji Islands, KON.

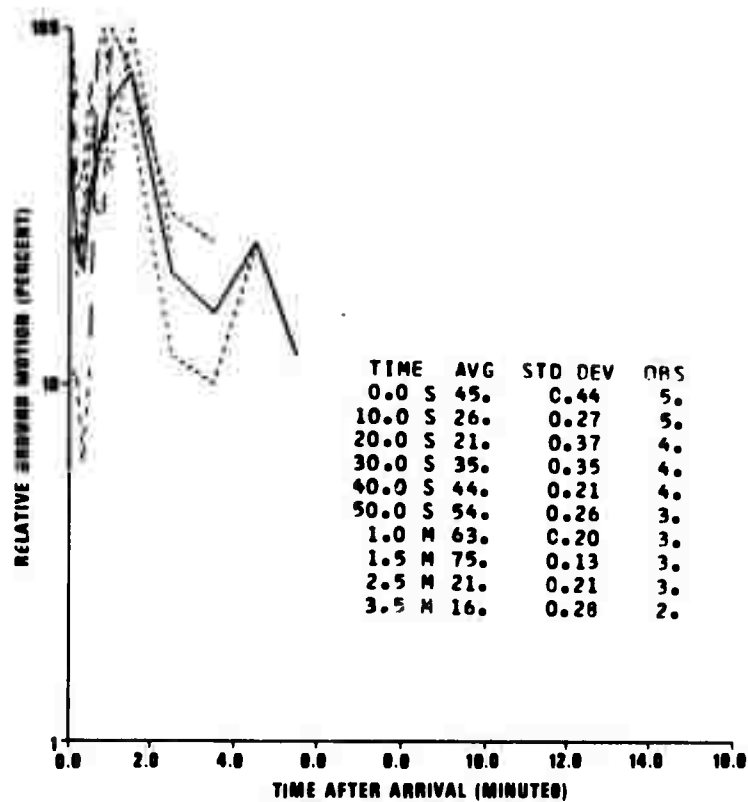


Figure 197. PKP coda characteristics, Tonga Islands-Fiji Islands, MAL.

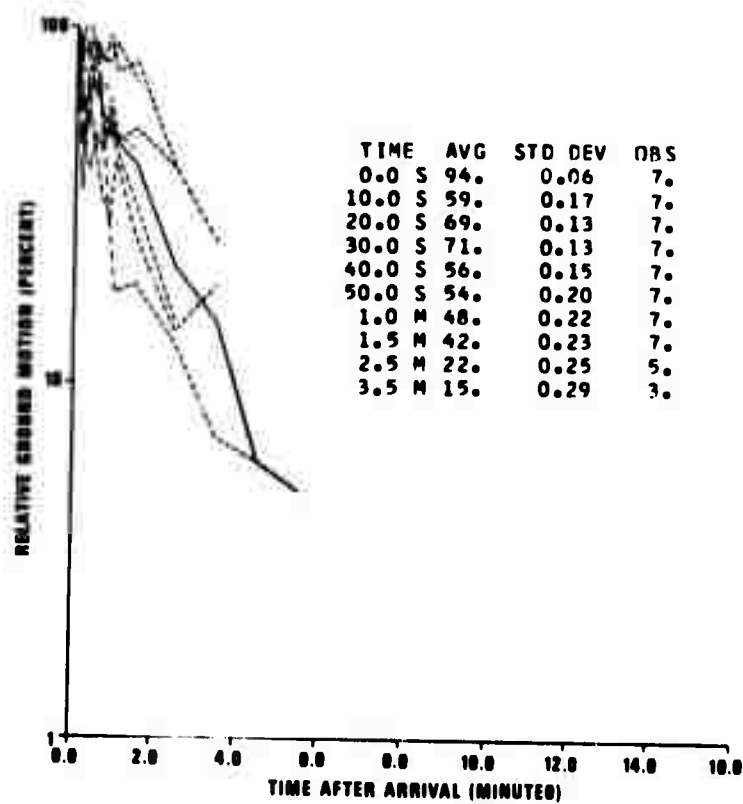


Figure 198. P coda characteristics, Tonga Islands-Fiji Islands, MAT.

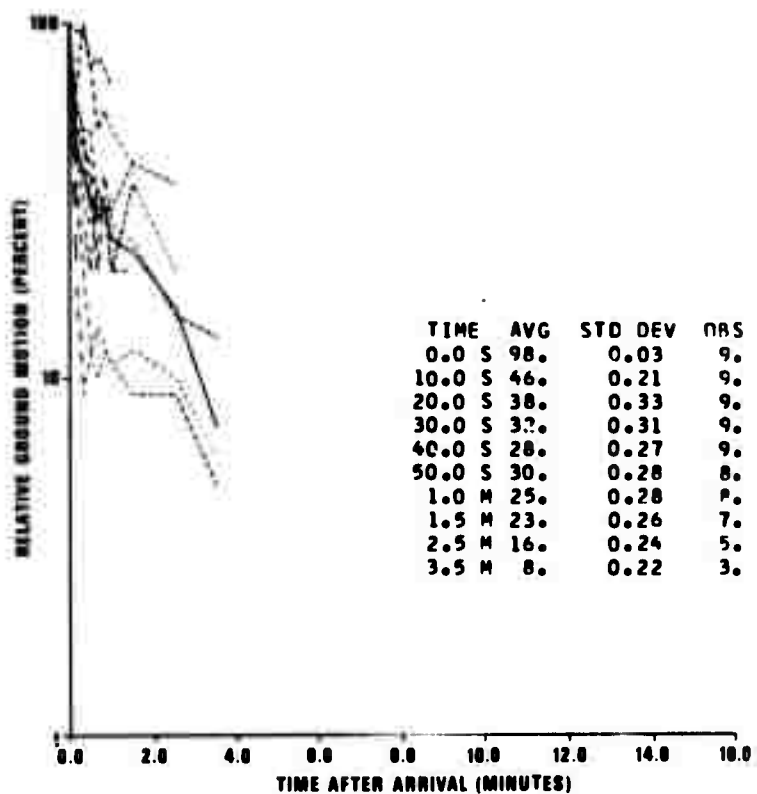


Figure 199. P coda characteristics, Tonga Islands-Fiji Islands, MUN.

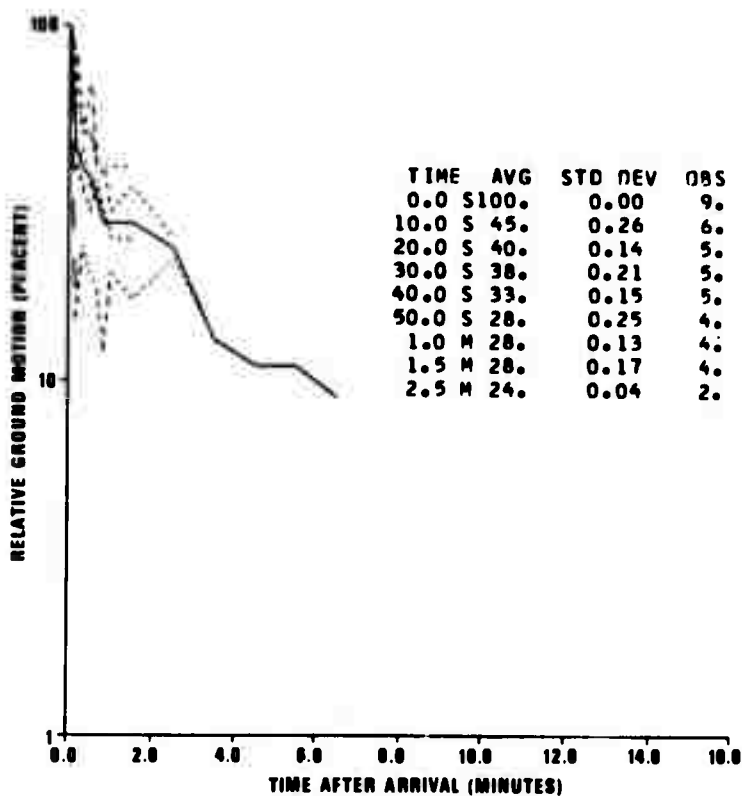


Figure 200. PKP coda characteristics, Tonga Islands-Fiji Islands, NDI.

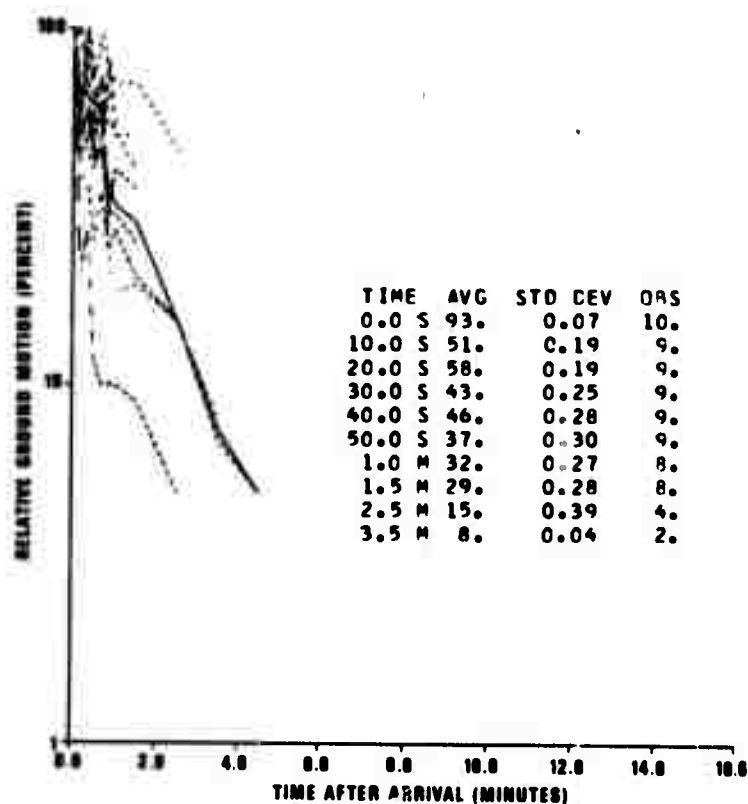


Figure 201. P coda characteristics, Tonga Islands-Fiji Islands, SEO.

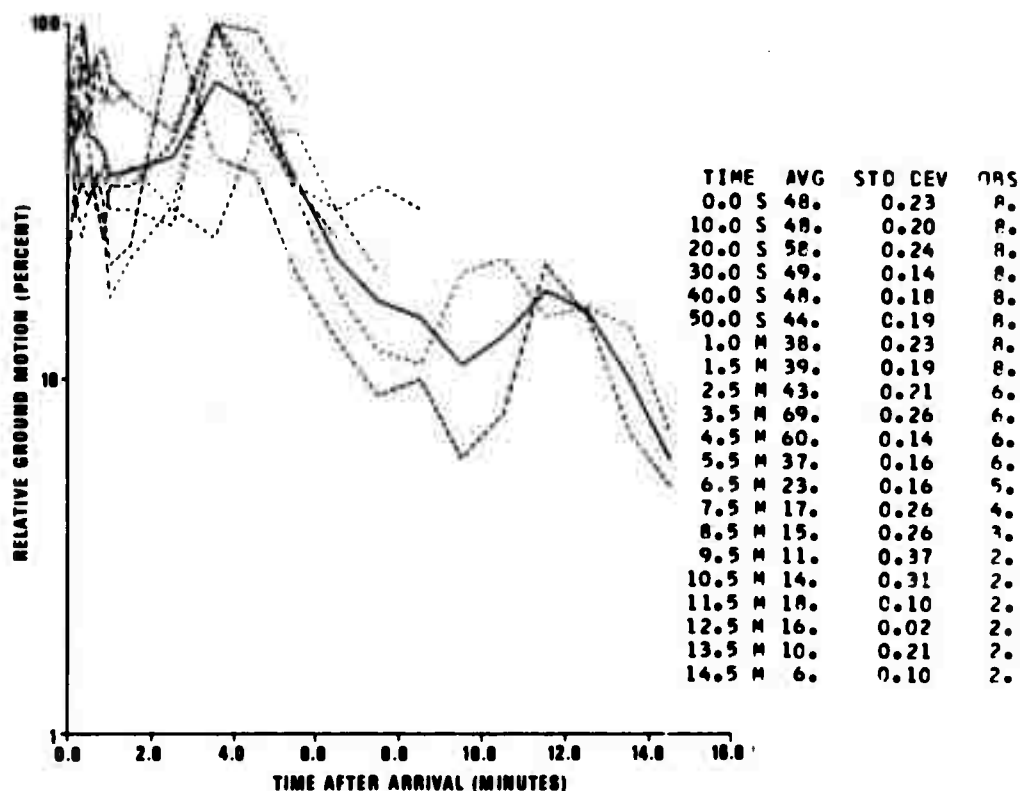


Figure 202. PKP coda characteristics, Tonga Islands-Fiji Islands, SHI.

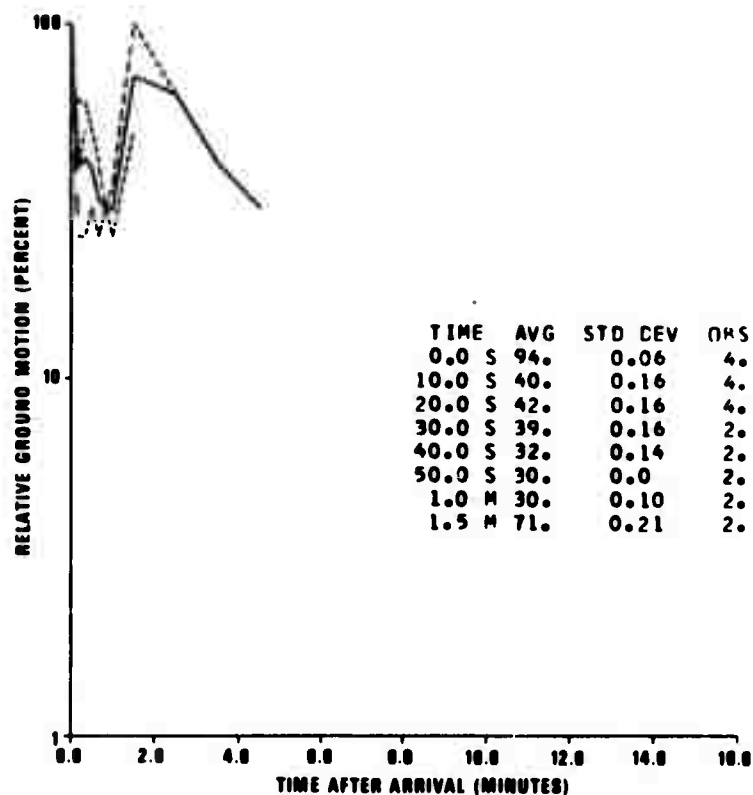


Figure 203. PKP coda characteristics, Tonga Islands-Fiji Islands, WES.

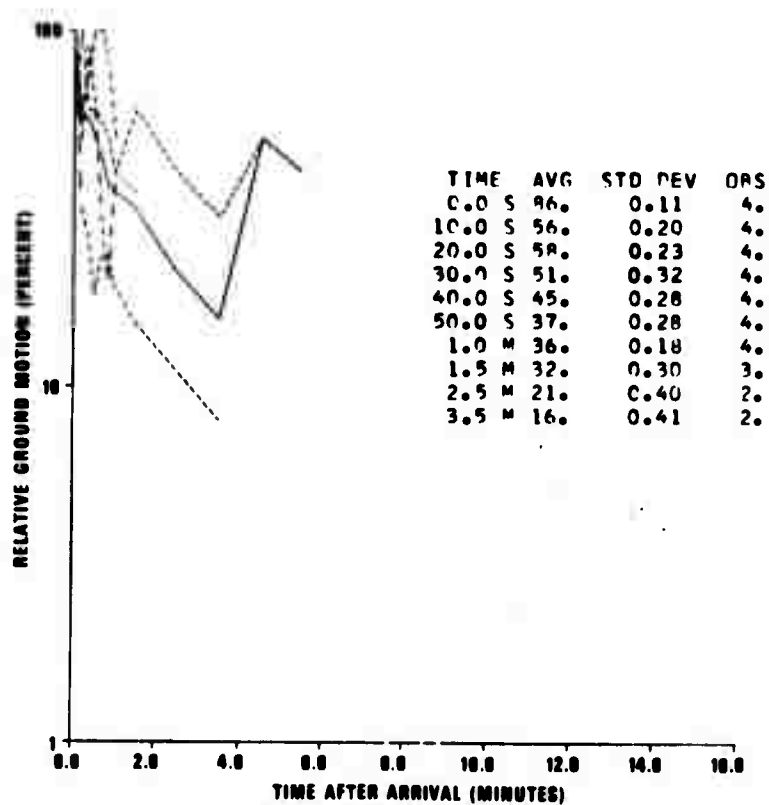


Figure 204. PKP coda characteristics, Turkey-Greece, ADE.

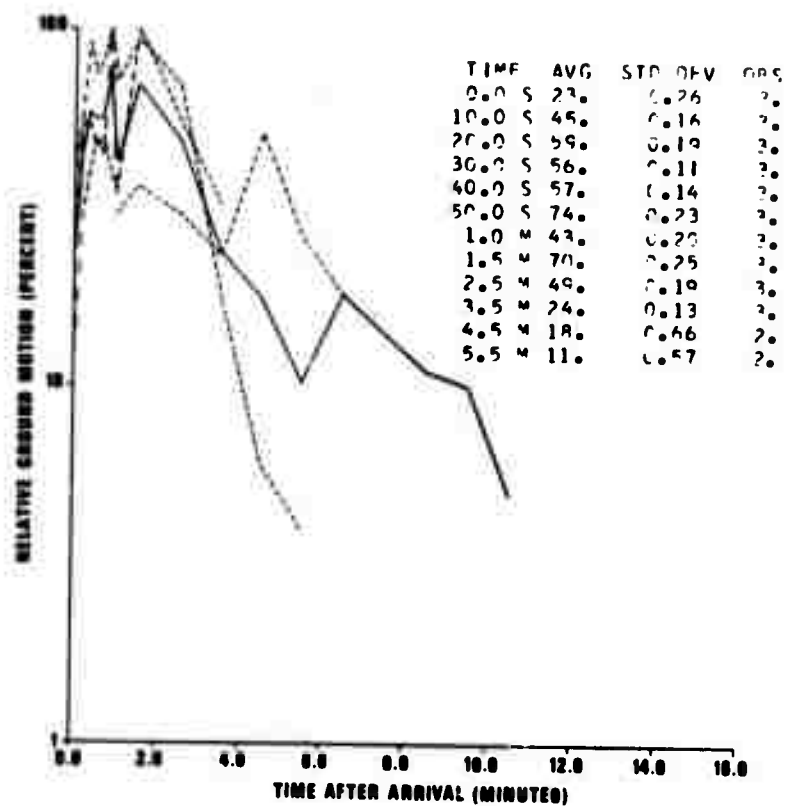


Figure 205. P coda characteristics, Turkey-Greece, AQU.

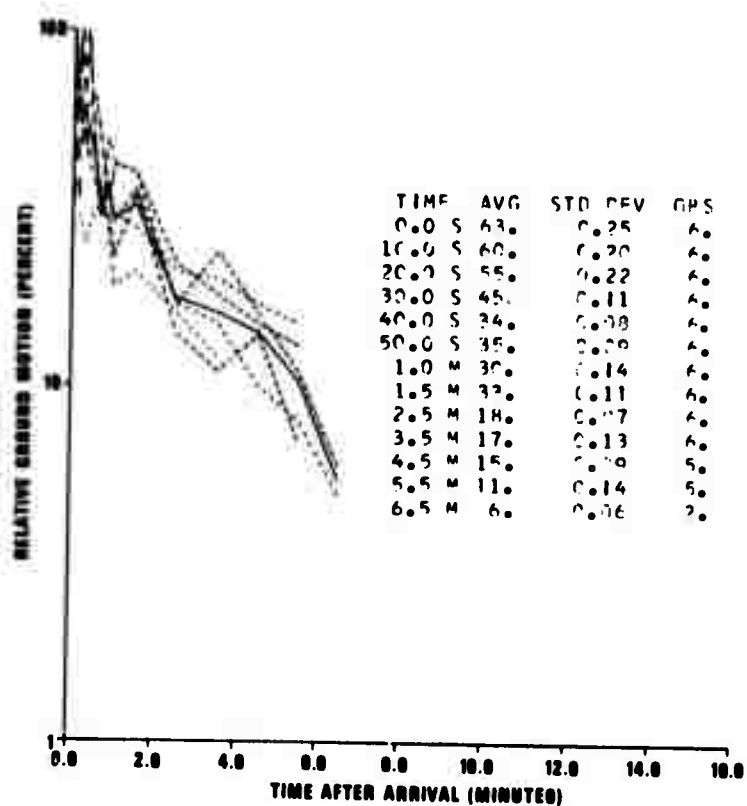


Figure 206. P coda characteristics, Turkey-Greece, BOZ.

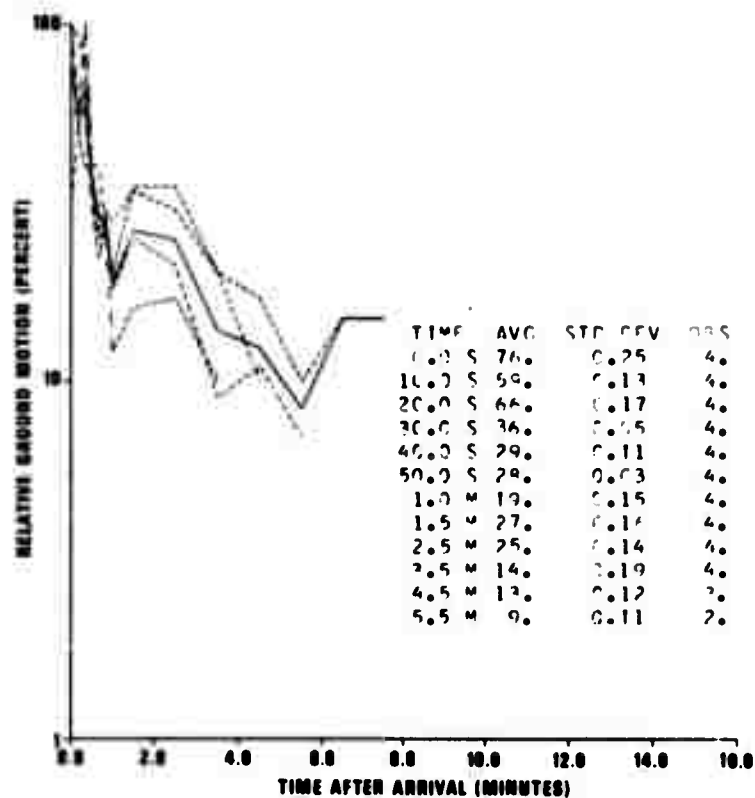


Figure 207. P coda characteristics, Turkey-Greece, CHG.

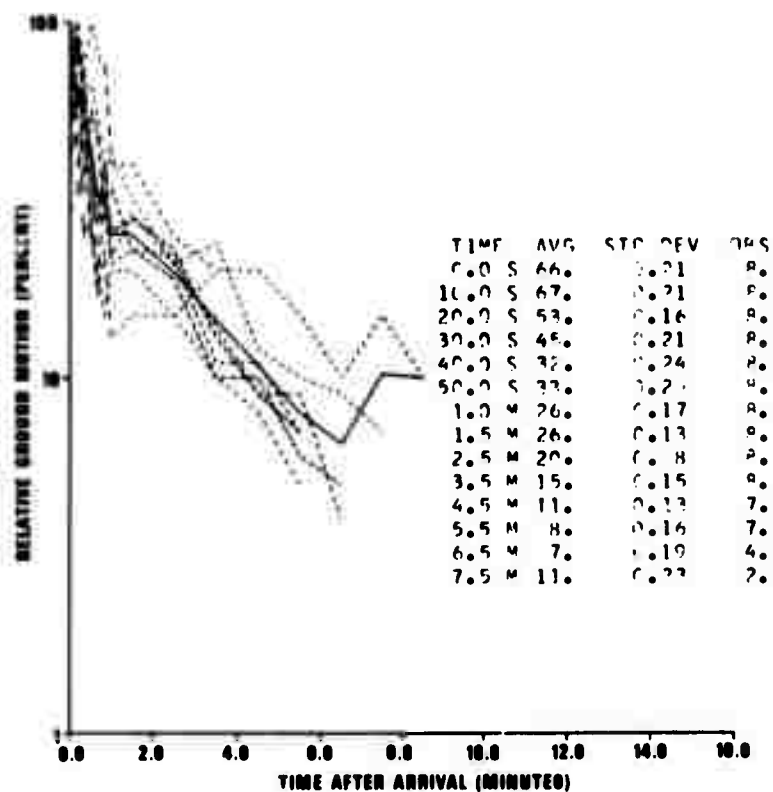


Figure 208. P coda characteristics, Turkey-Greece, CMC.

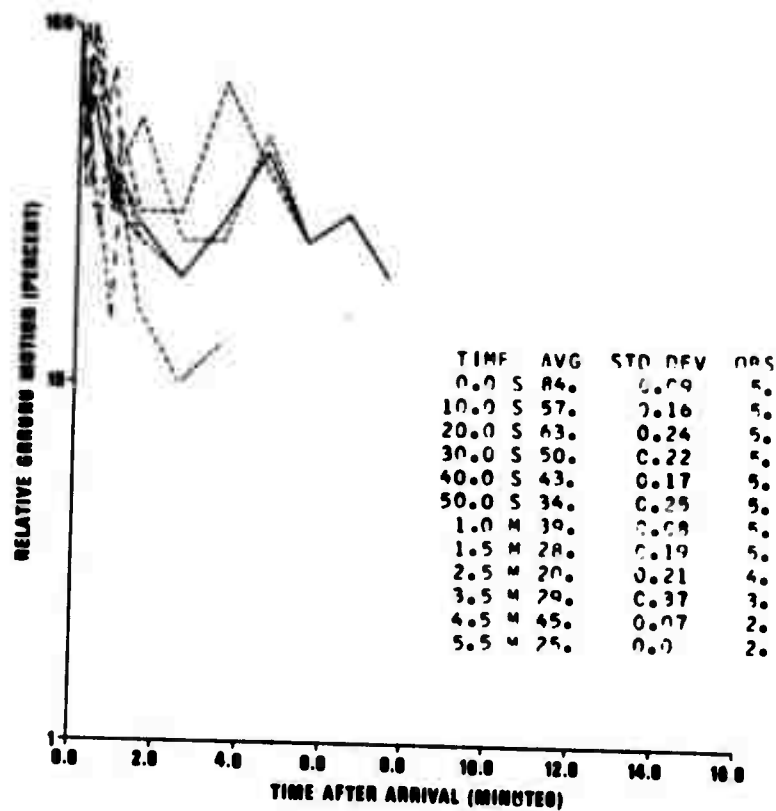


Figure 209. P coda characteristics, Turkey-Greece, DAL.

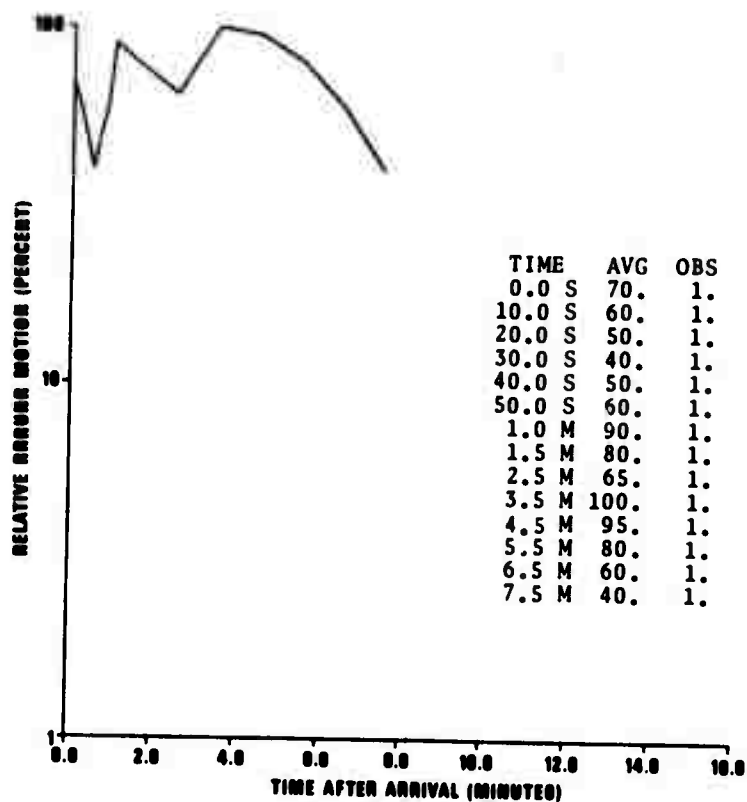


Figure 210. P coda characteristics, Turkey-Greece, DAV.

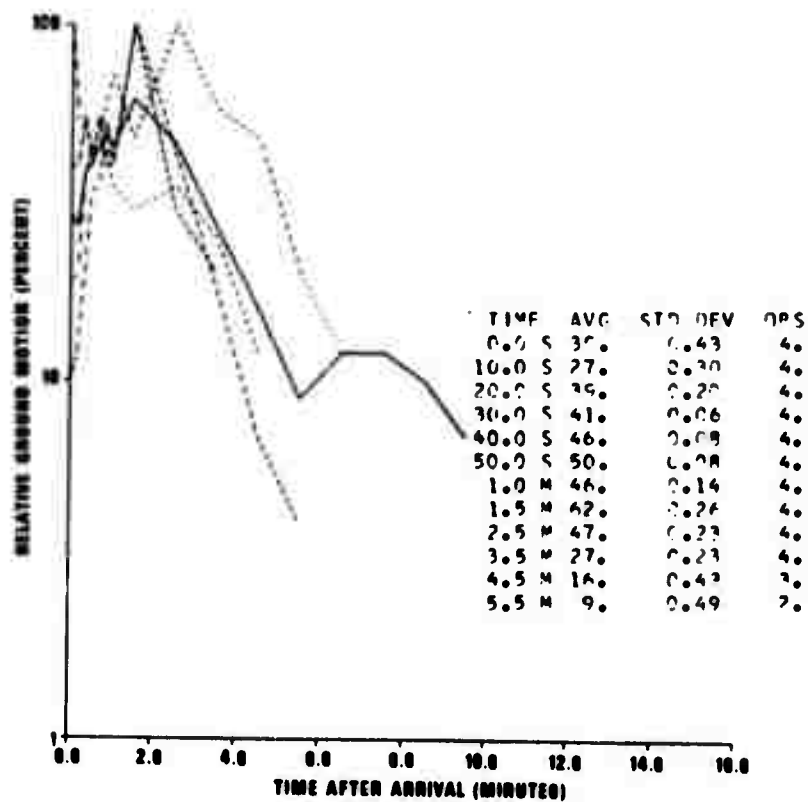


Figure 211. P coda characteristics, Turkey-Greece, IST.

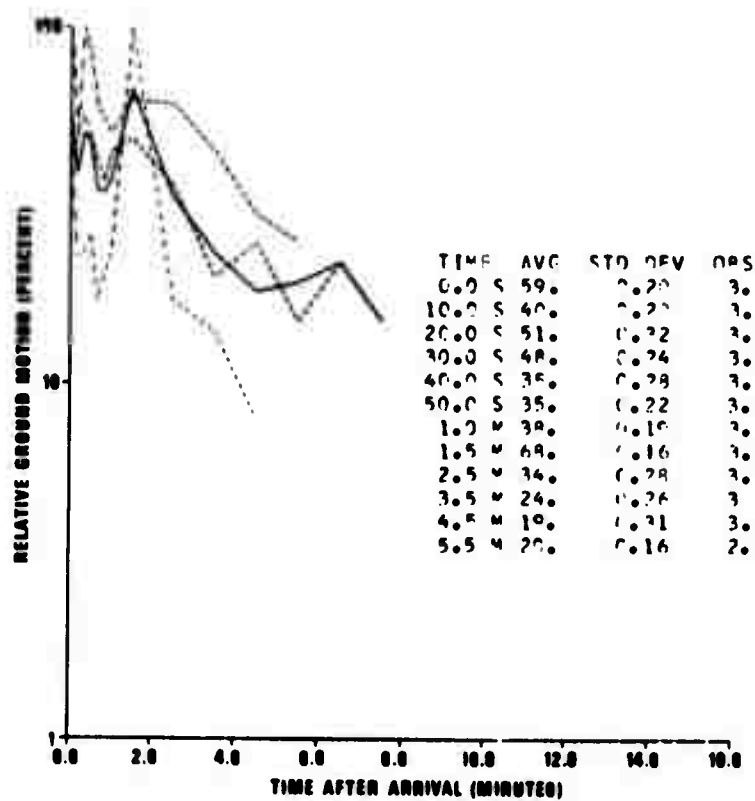


Figure 212. P coda characteristics, Turkey-Greece, KBL.

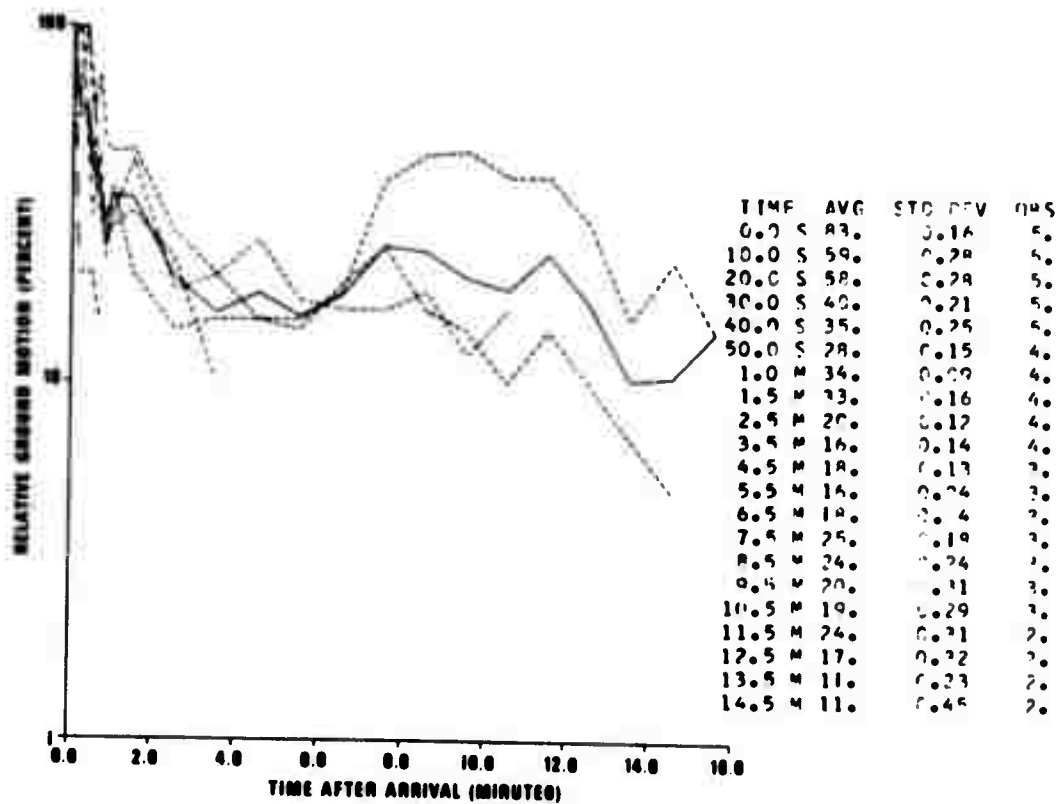


Figure 213. P coda characteristics, Turkey-Greece, KON.

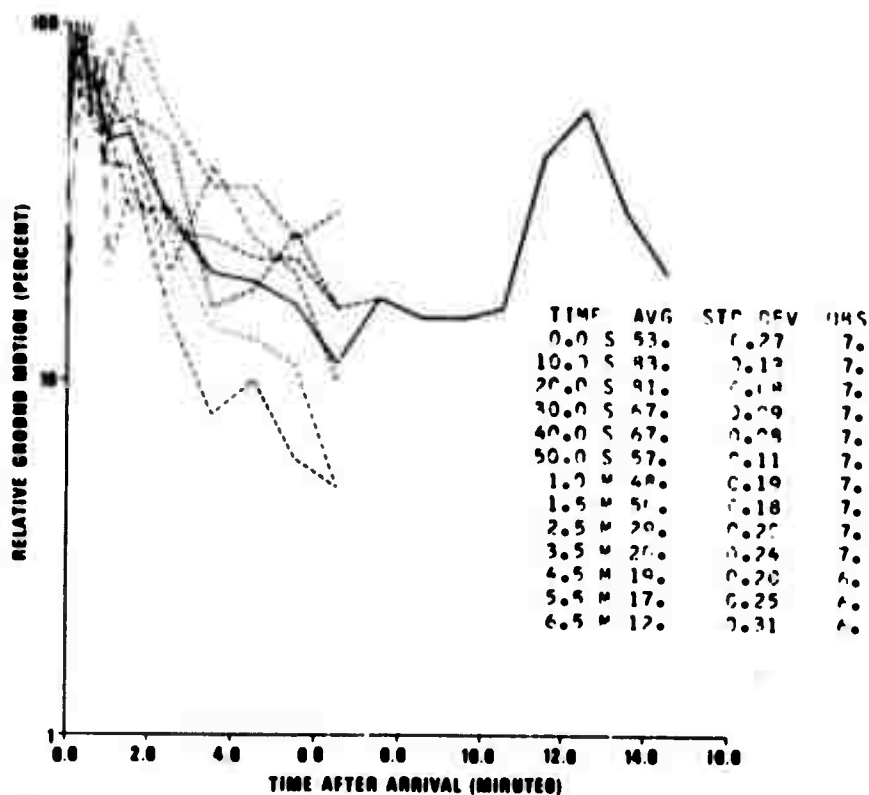


Figure 214. P coda characteristics, Turkey-Greece, MAL.

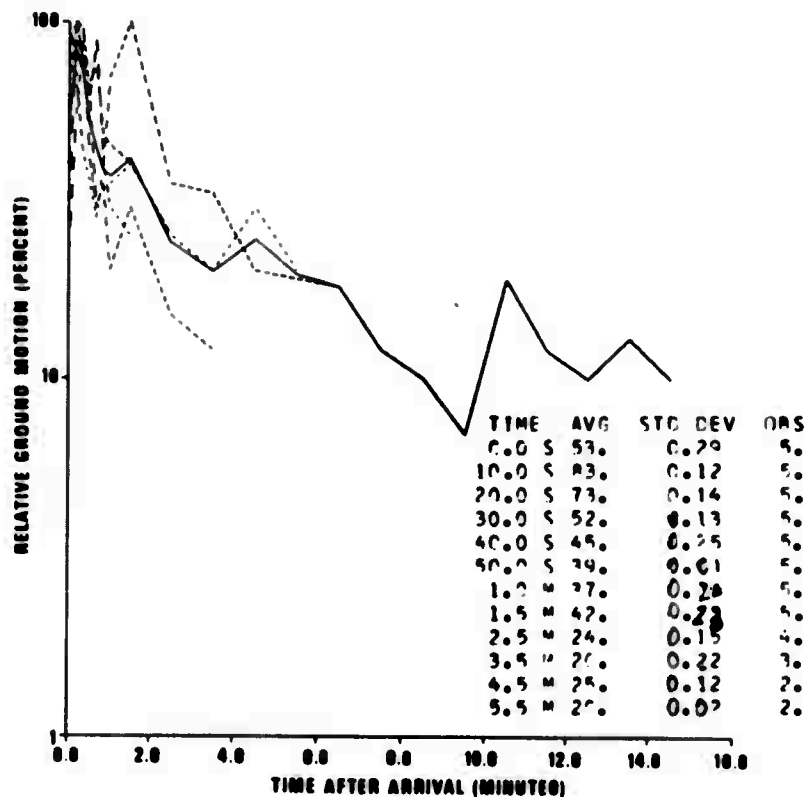
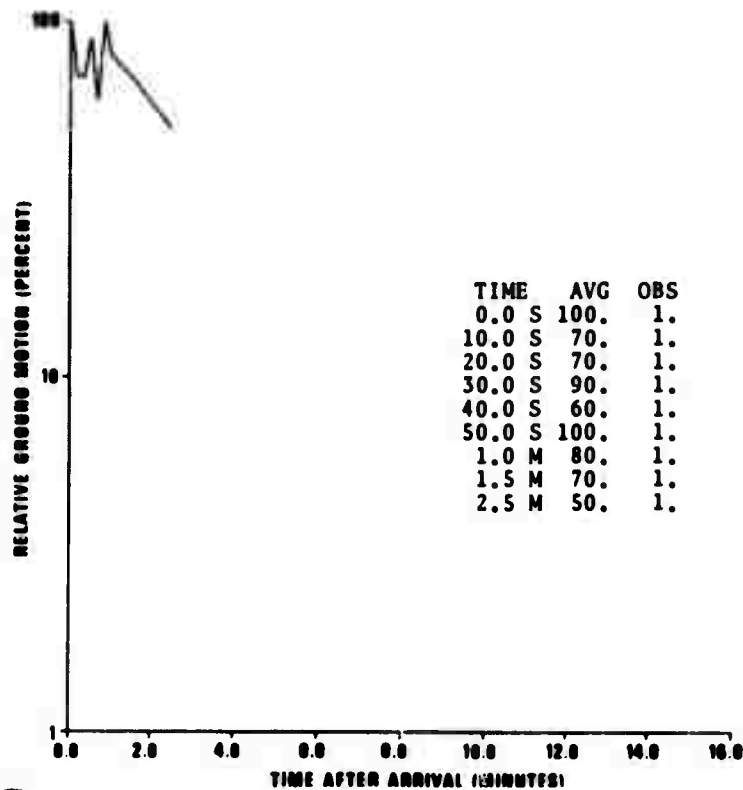


Figure 215. P coda characteristics, Turkey-Greece, MAT.



142 Figure 216. PKP coda characteristics, Turkey-Greece, MUN.

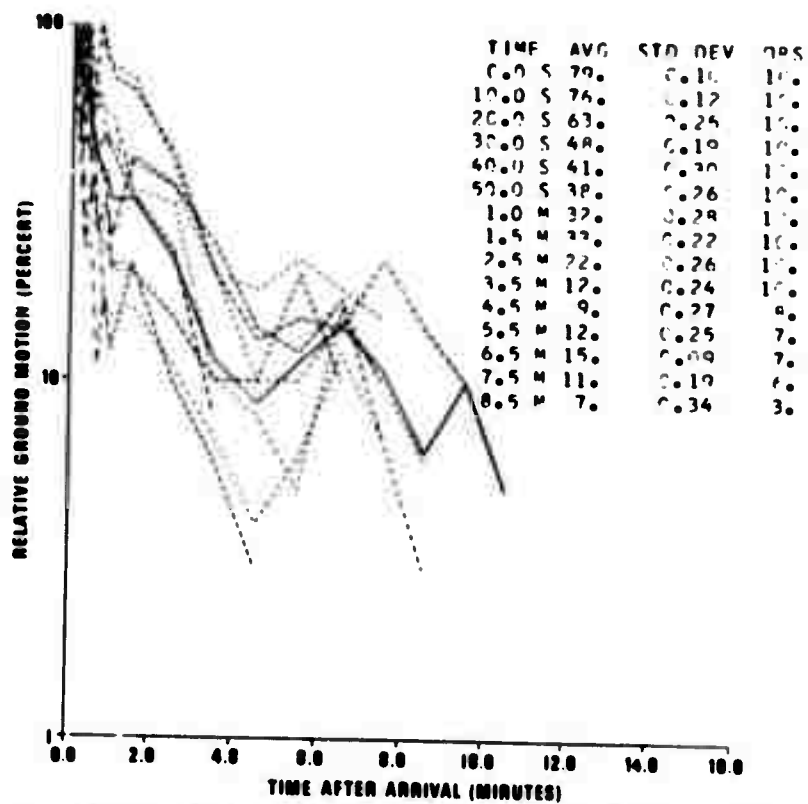


Figure 217. P coda characteristics, Turkey-Greece, NDI.

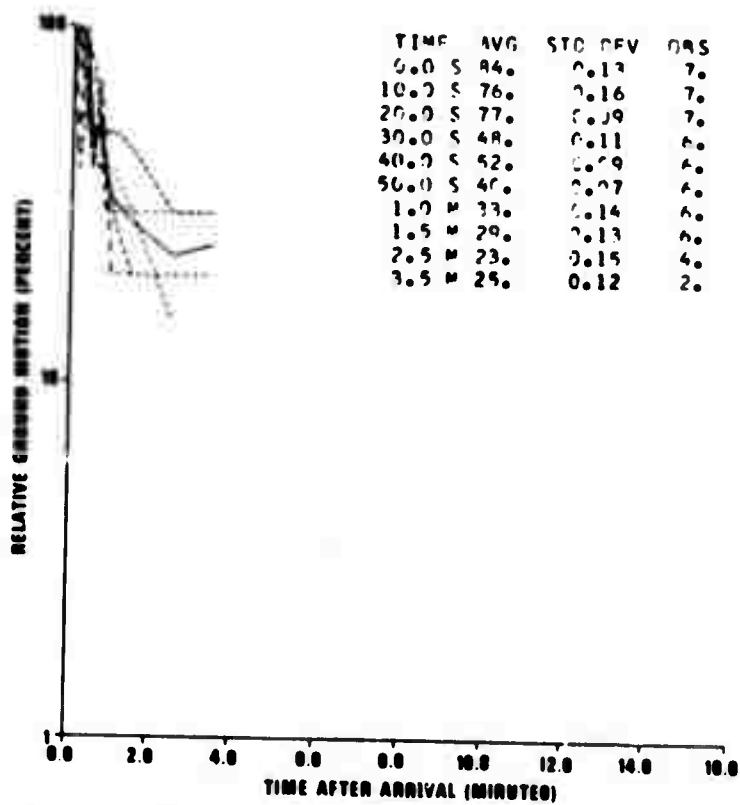


Figure 218. P coda characteristics, Turkey-Greece, SEO.

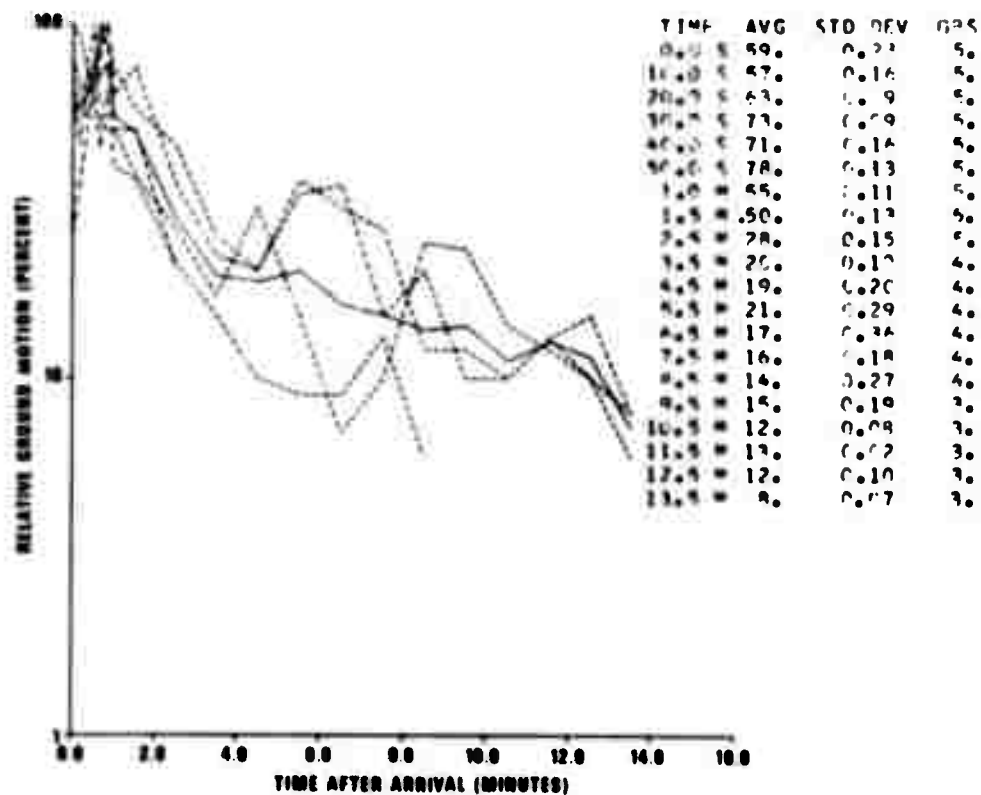


Figure 219. P coda characteristics, Turkey-Greece, SHI.

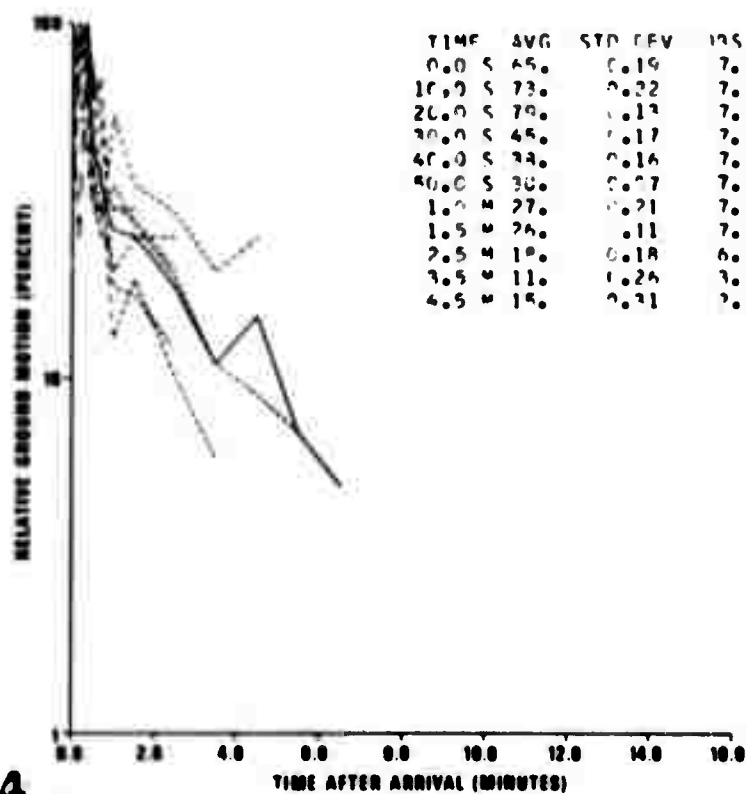


Figure 220. P coda characteristics, Turkey-Greece, WES.

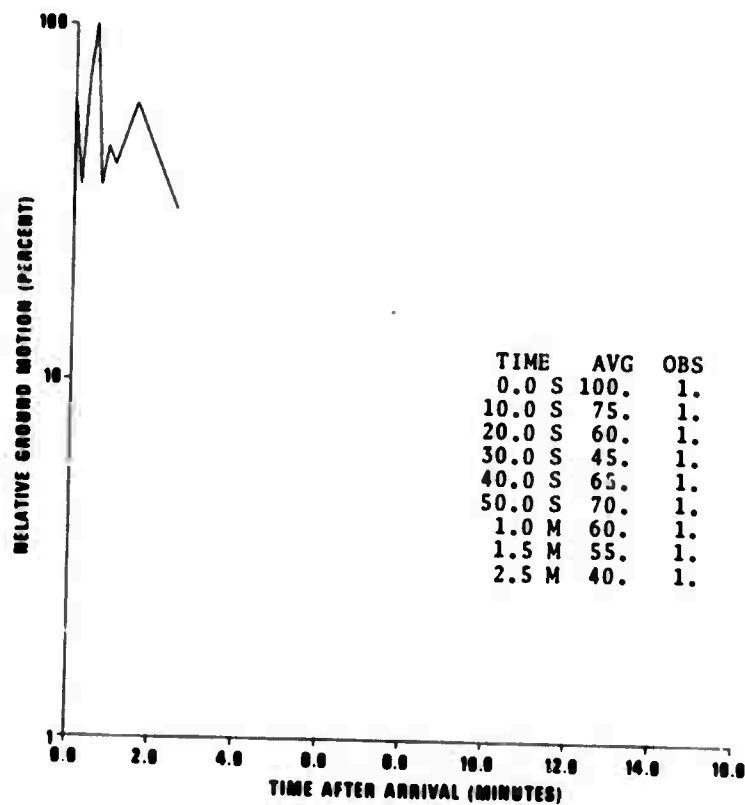


Figure 221. P coda characteristics, Iran-Turkey, ADE.

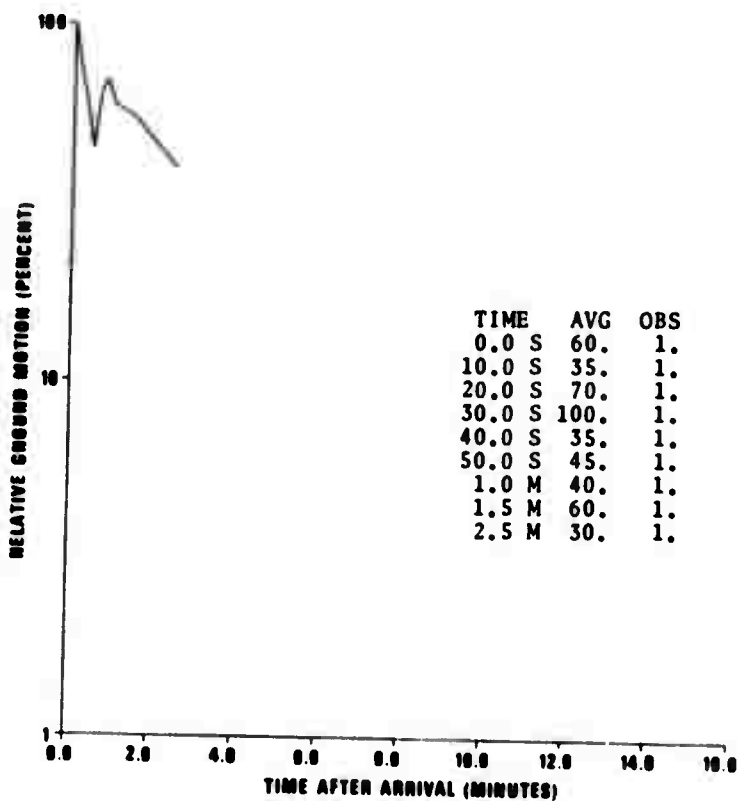


Figure 222. PKP coda characteristics, Iran-Turkey, ADE.

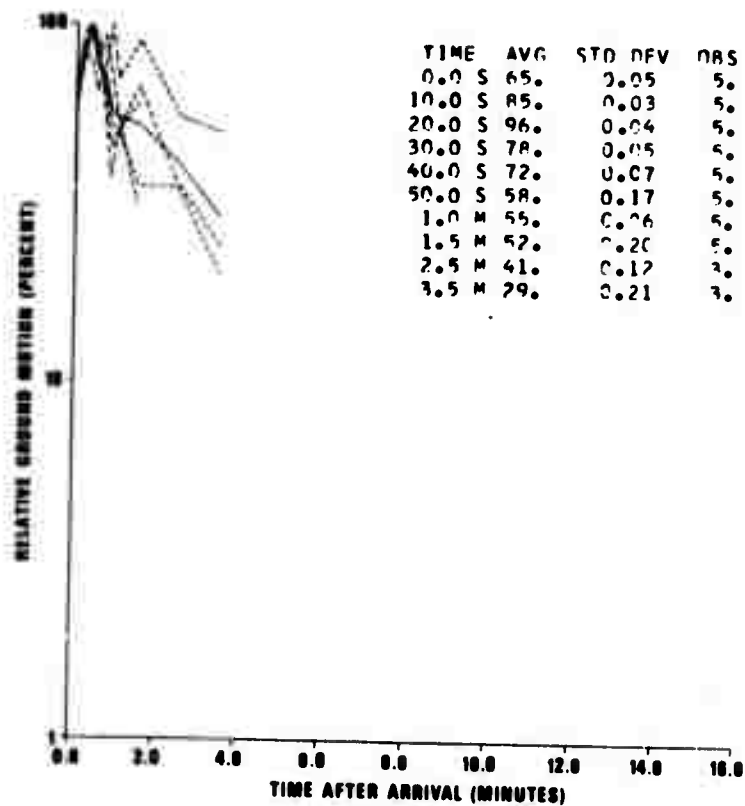


Figure 223. P coda characteristics, Iran-Turkey, AQU.

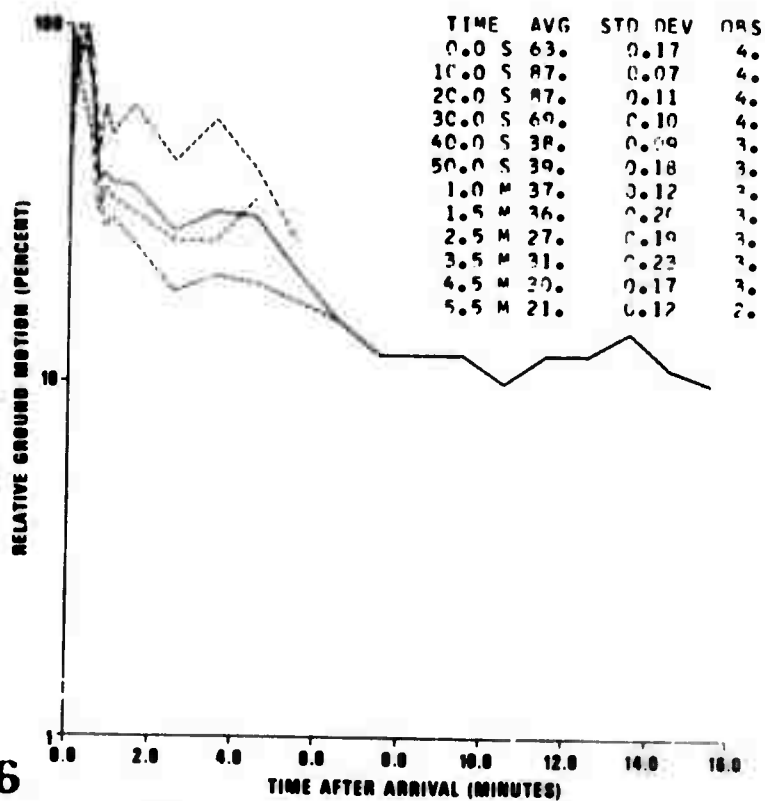


Figure 224. P coda characteristics, Iran-Turkey, BOZ.

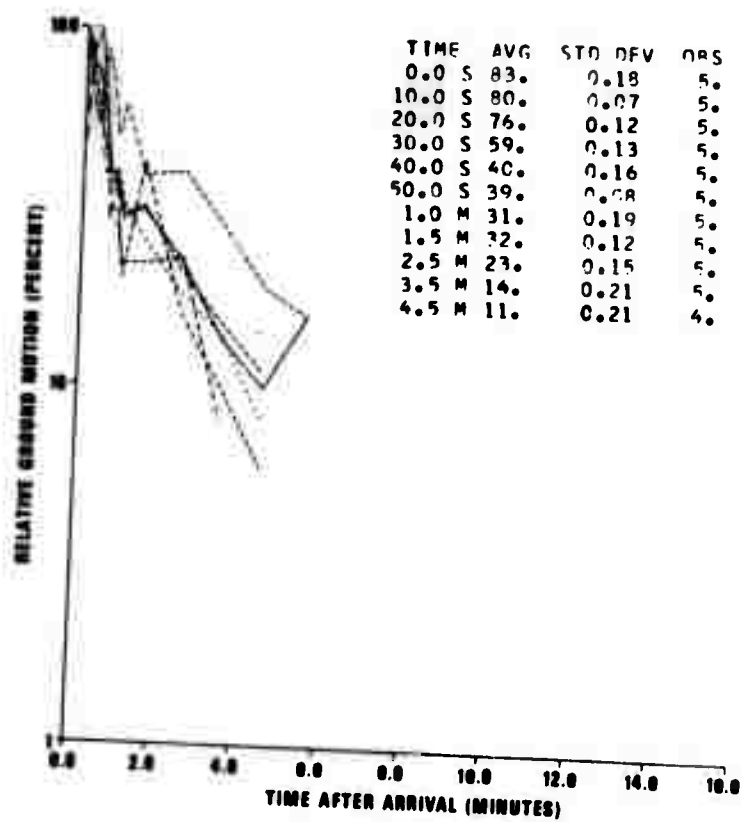


Figure 225. P coda characteristics, Iran-Turkey, CHG.

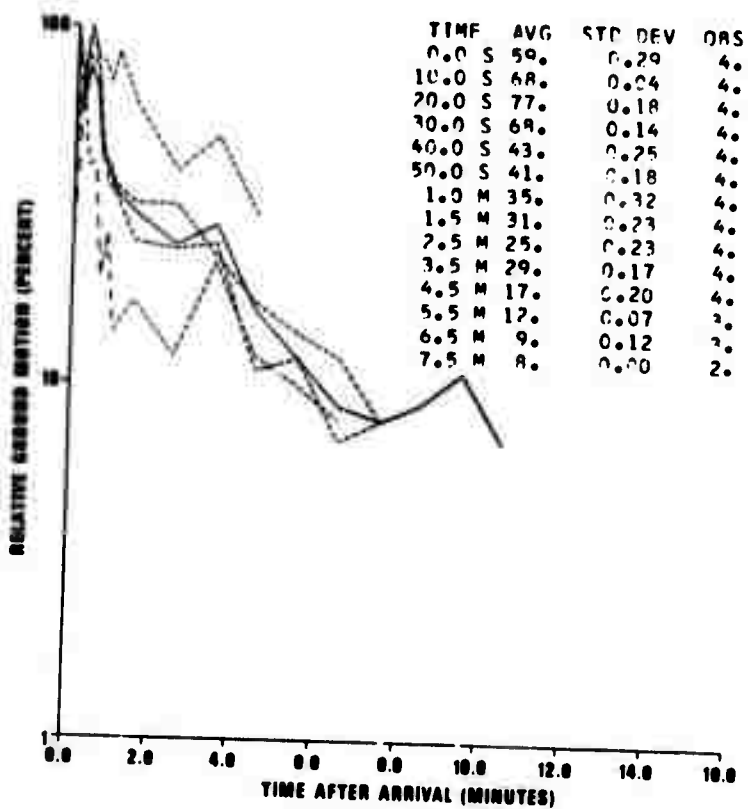


Figure 226. P coda characteristics, Iran-Turkey, CMC.

Figure 227. No observations, Iran-Turkey, DAL.

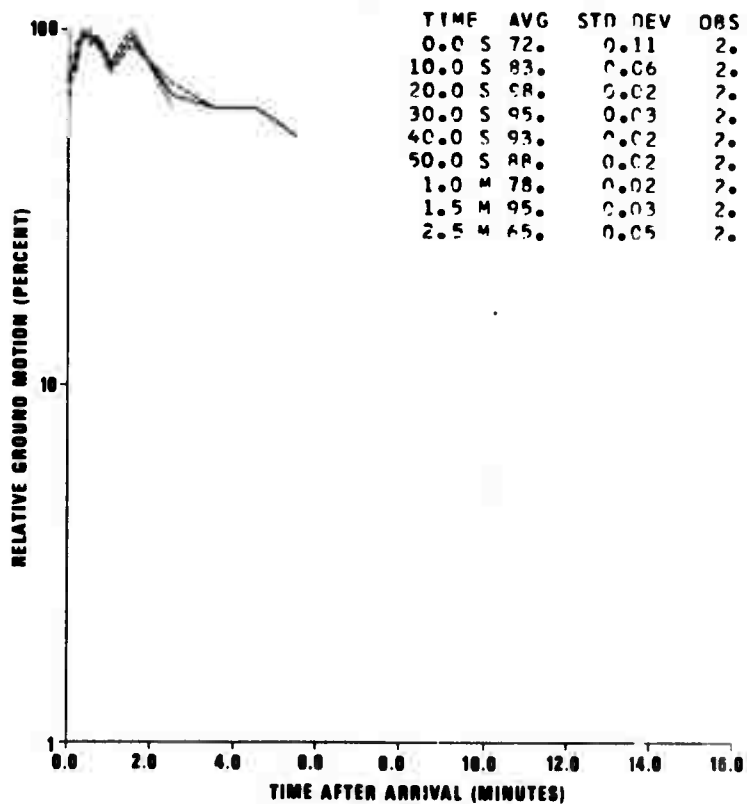
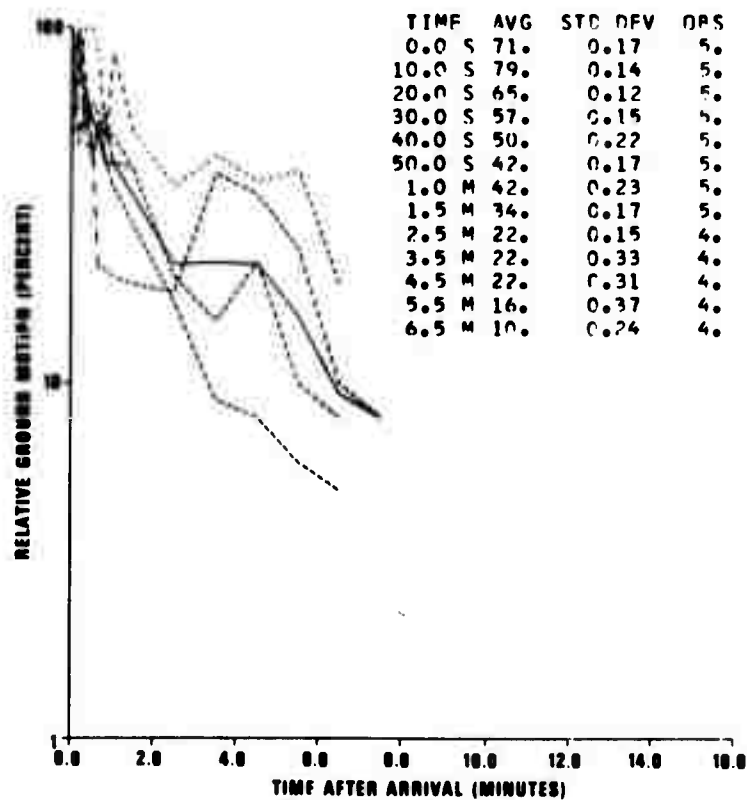


Figure 228. P coda characteristics, Iran-Turkey, DAV.



148 Figure 229. P coda characteristics, Iran-Turkey, IST.

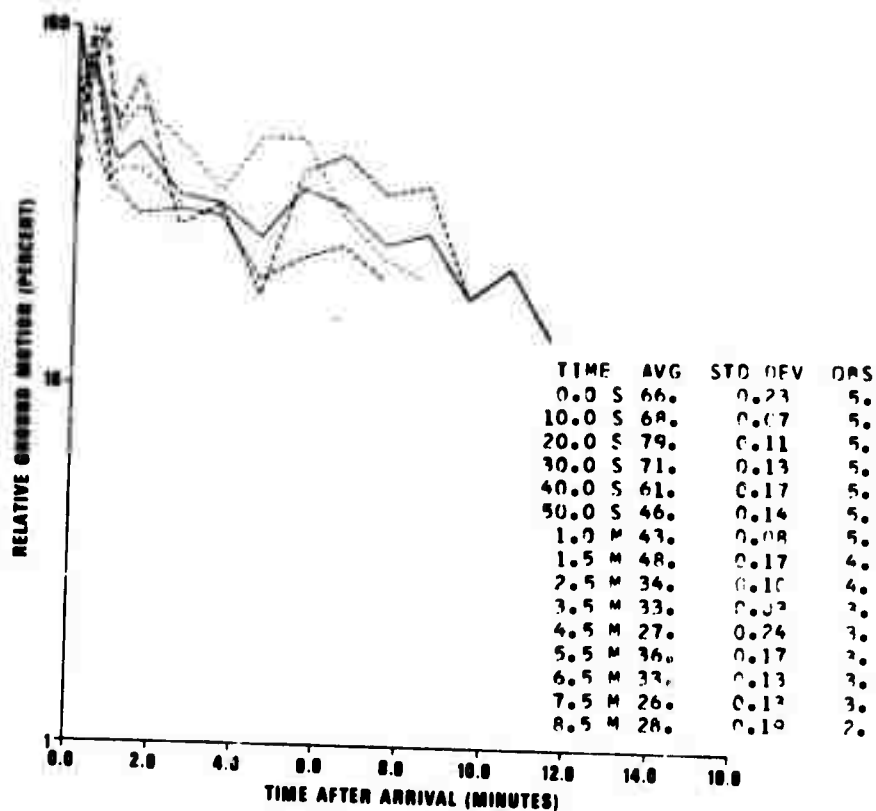


Figure 230. P coda characteristics, Iran-Turkey, KBL.

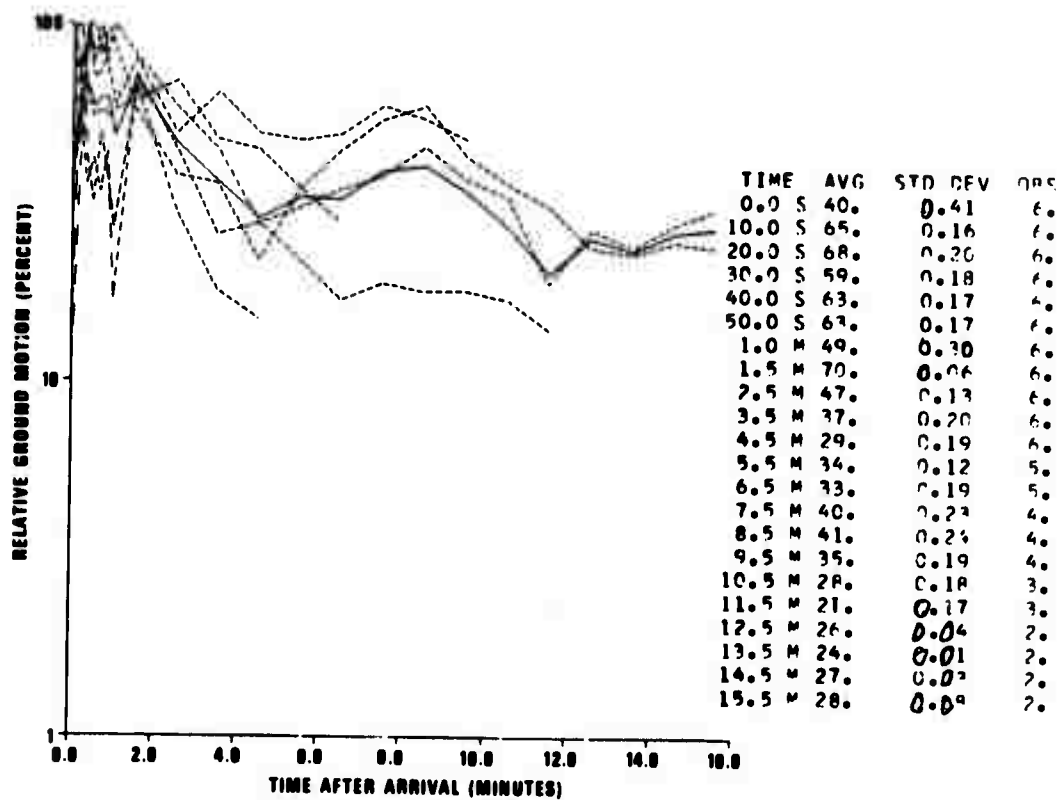


Figure 231. P coda characteristics, Iran-Turkey, KON.

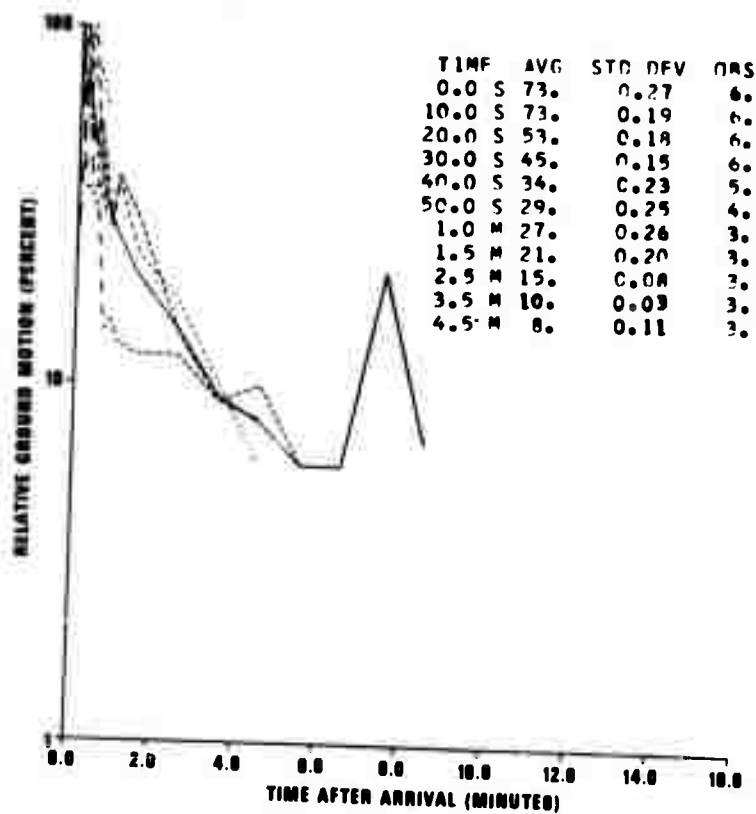


Figure 232. P coda characteristics, Iran-Turkey, MAL.

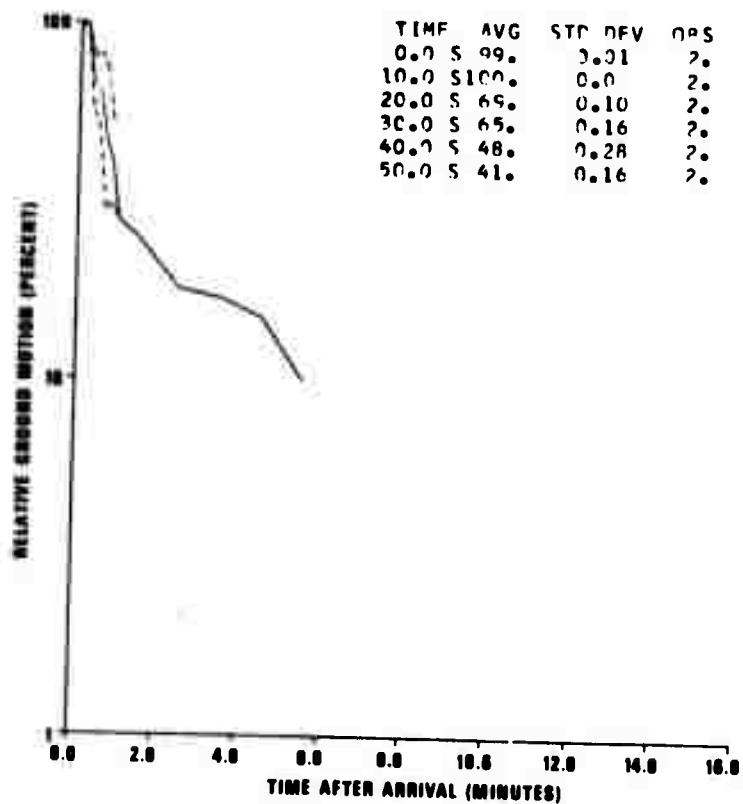


Figure 233. P coda characteristics, Iran-Turkey, MAT.

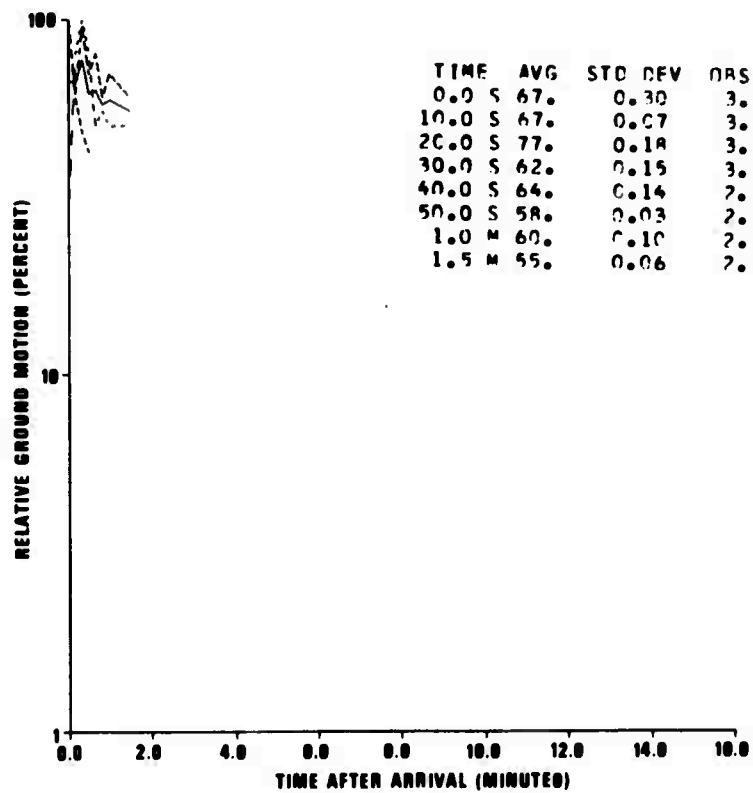


Figure 234. P coda characteristics, Iran-Turkey, MUN.

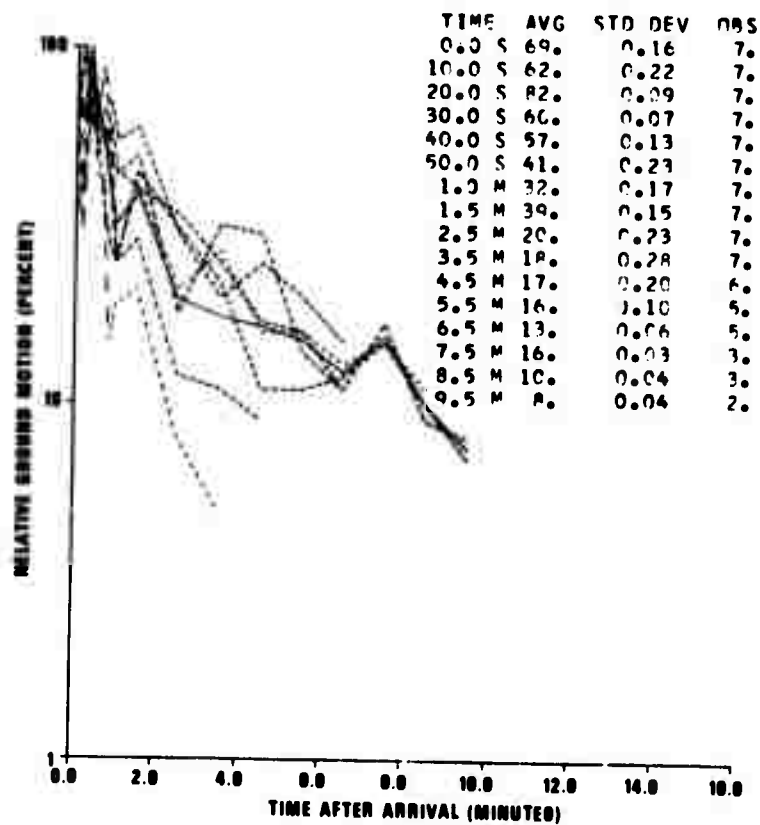


Figure 235. P coda characteristics, Iran-Turkey, NDI.

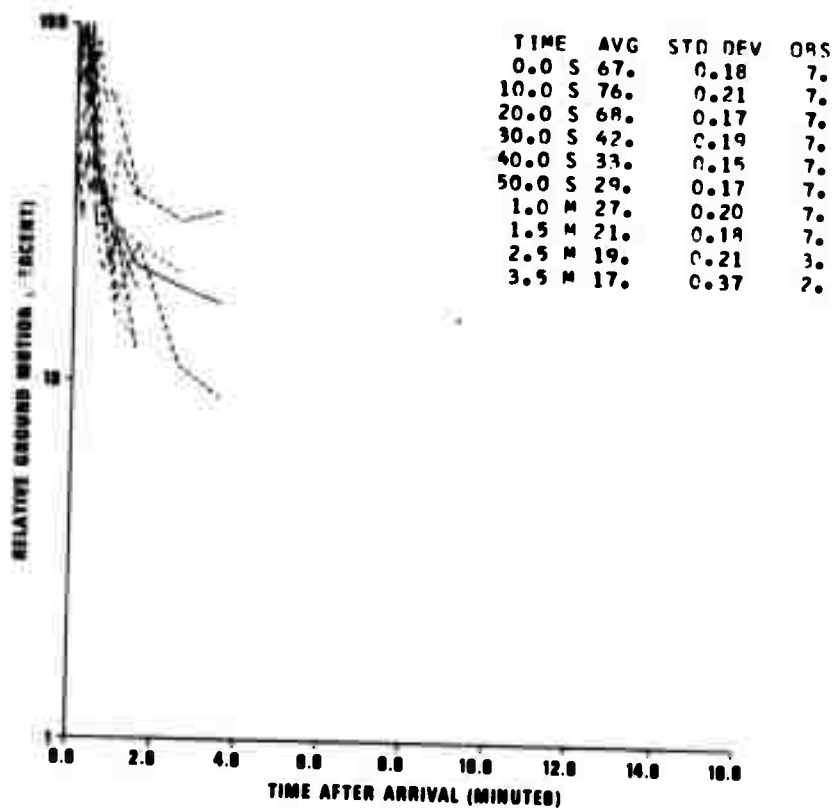


Figure 236. P coda characteristics, Iran-Turkey, SEO.

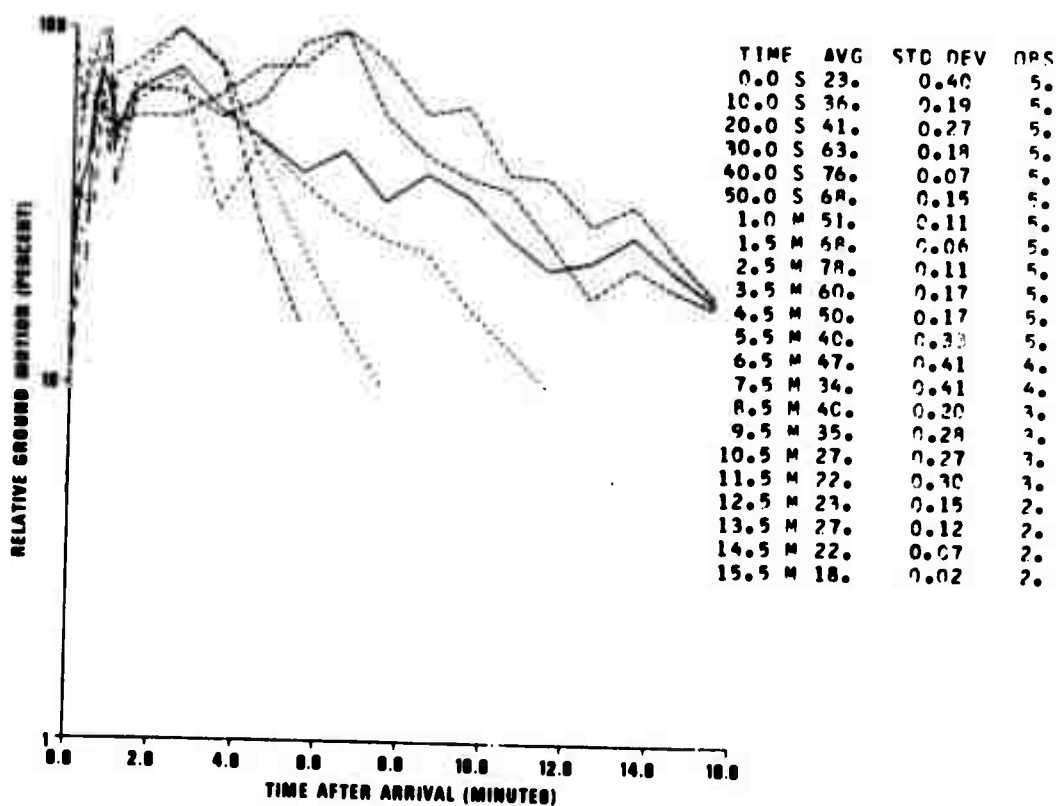


Figure 237. P coda characteristics, Iran-Turkey, SHI.

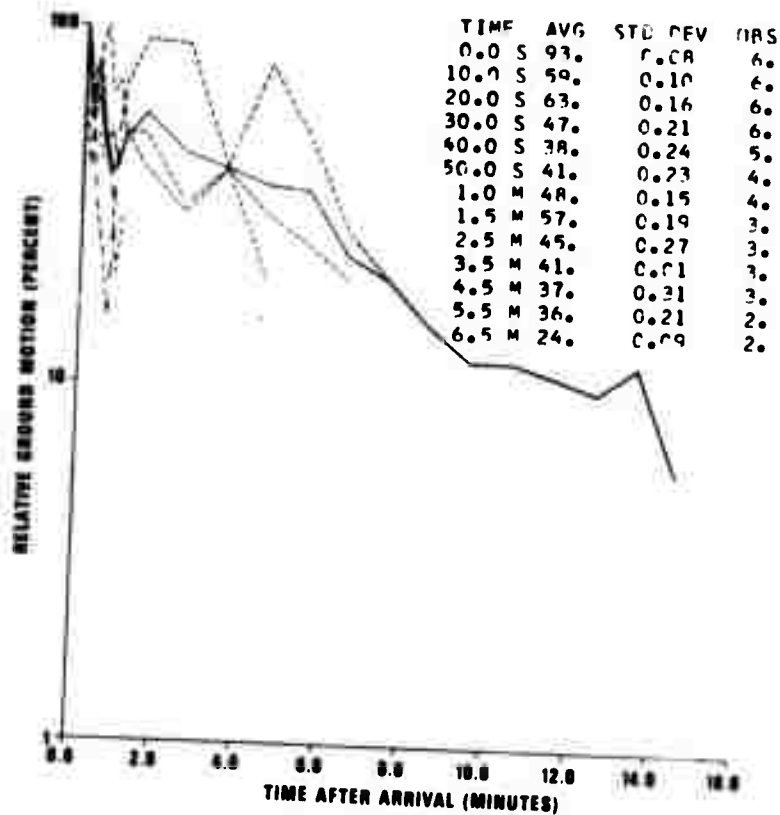


Figure 238. P coda characteristics, Iran-Turkey, WES.

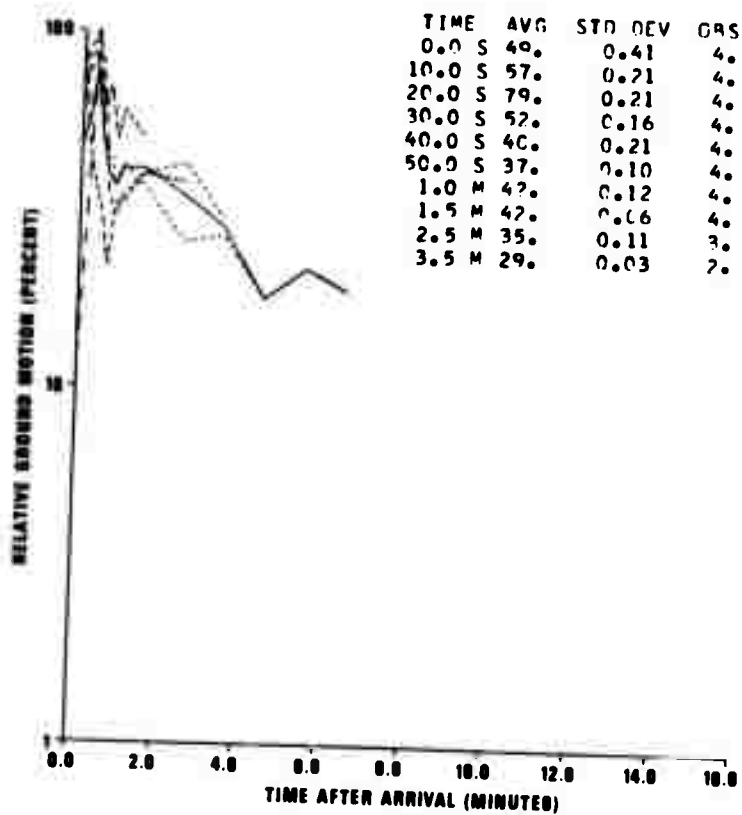


Figure 239. P coda characteristics, Tadzhik-Hindu Kush, ADE.

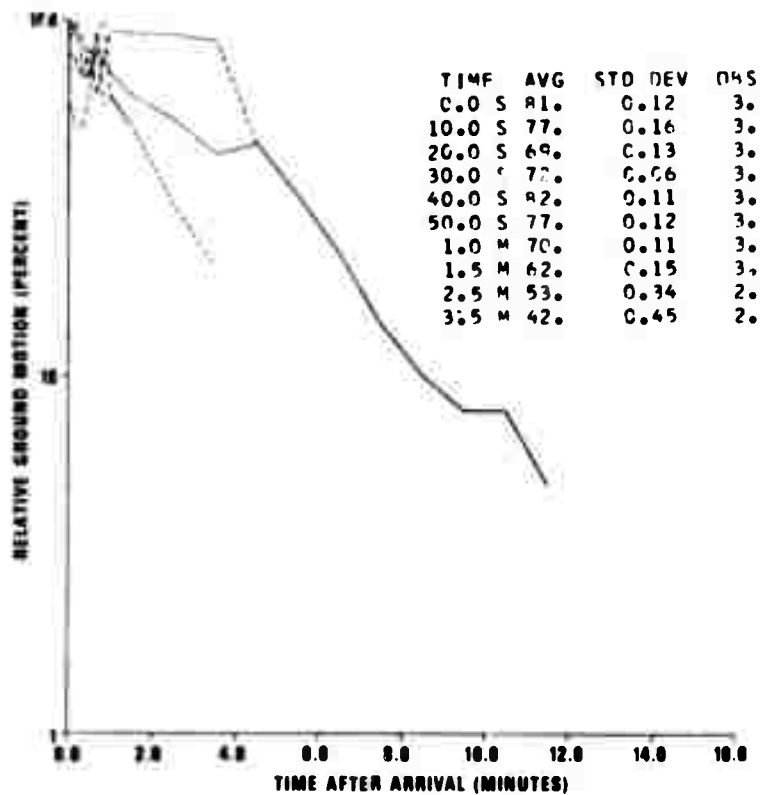


Figure 240. P coda characteristics, Tadzhik-Hindu Kush, AQU.

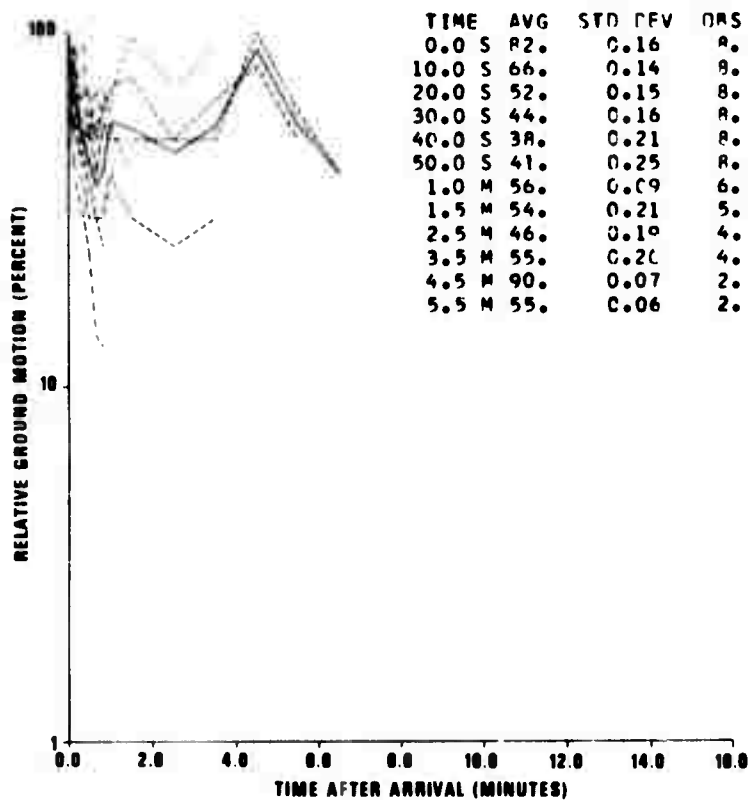


Figure 241. P coda characteristics, Tadzhik-Hindu Kush, BOZ.

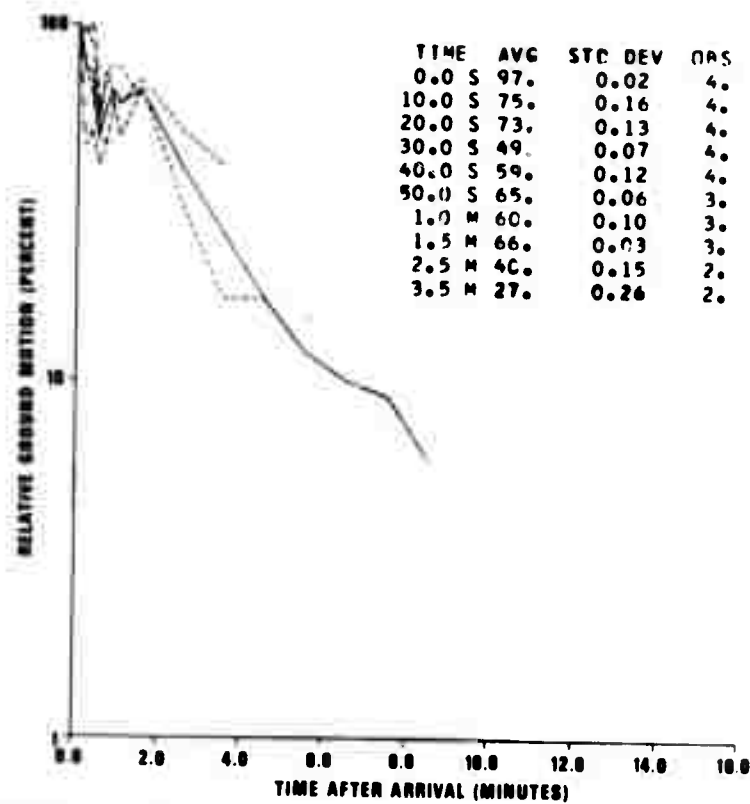


Figure 242. P coda characteristics, Tadzhih-Hindu Kush, CHG.

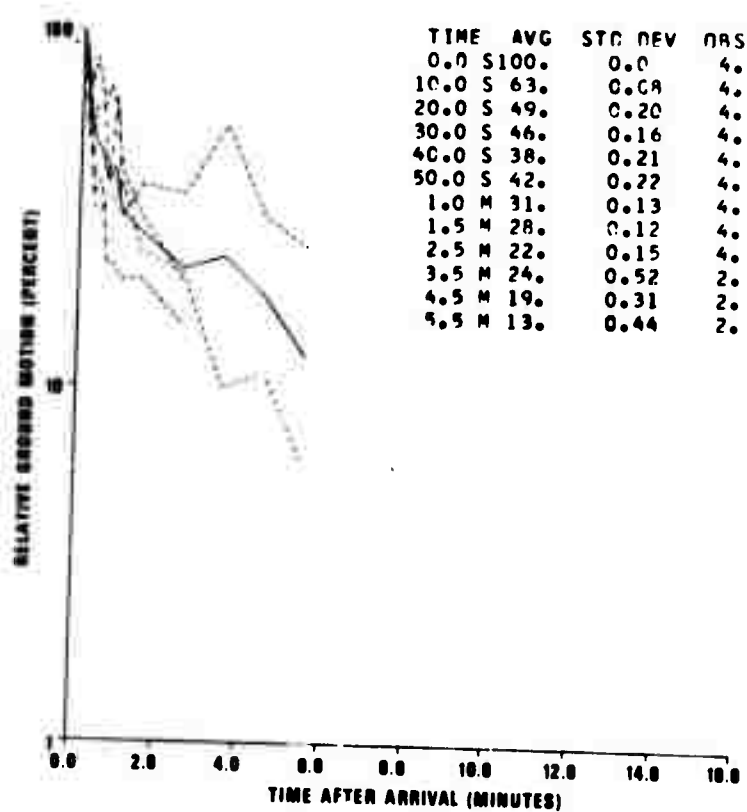


Figure 243. P coda characteristics, Tadzhih-Hindu Kush, CMC.

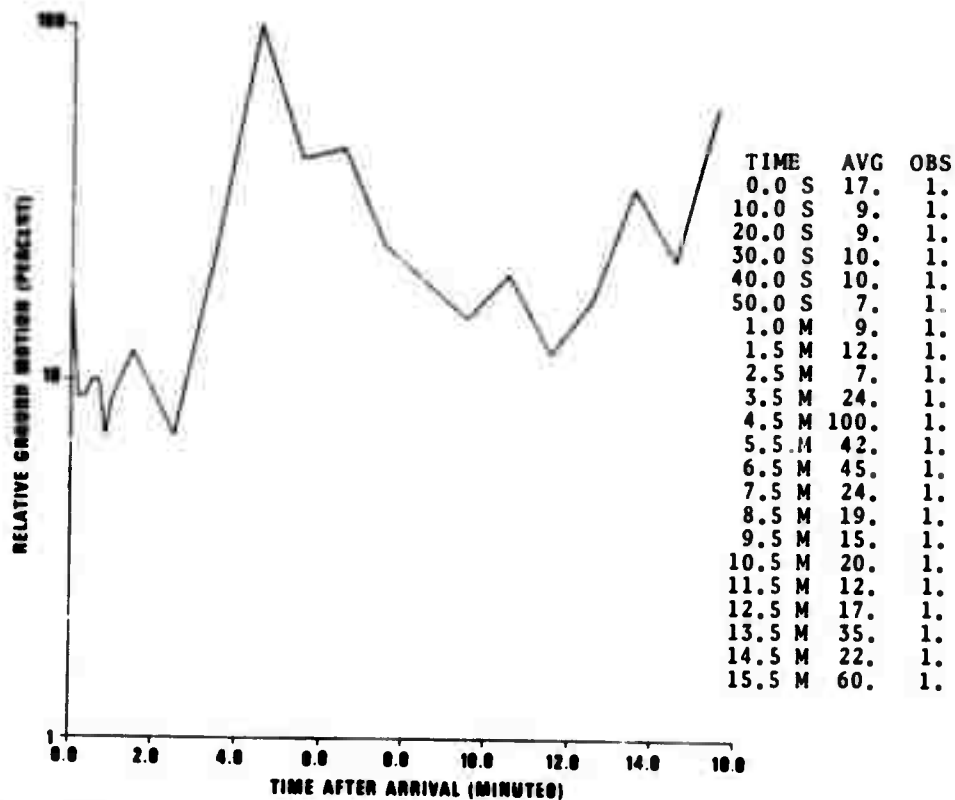


Figure 244. P coda characteristics, Tadjhik-Hindu Kush, DAL.

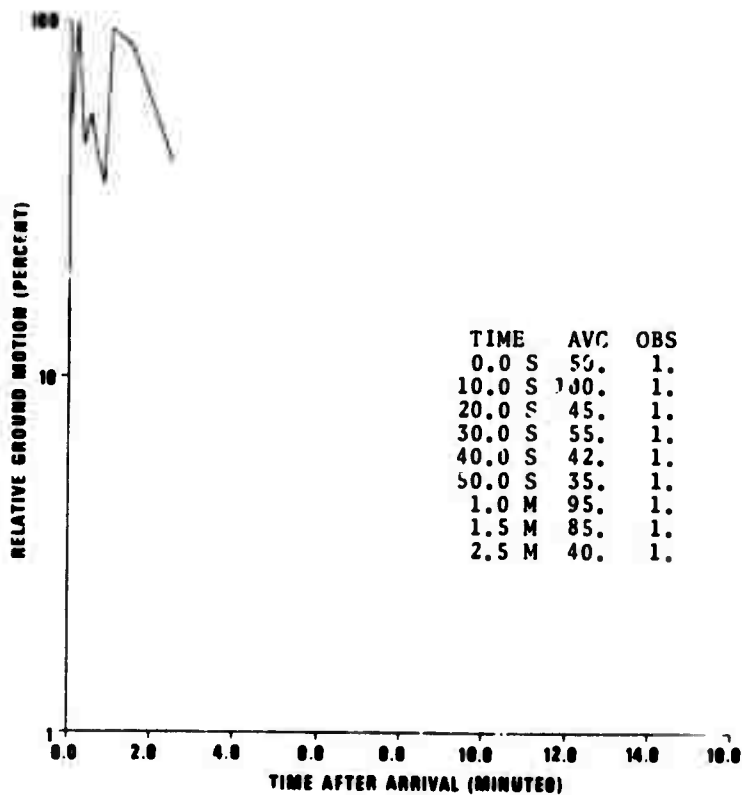


Figure 245. PKP coda characteristics, Tadjhik-Hindu Kush, DAL.

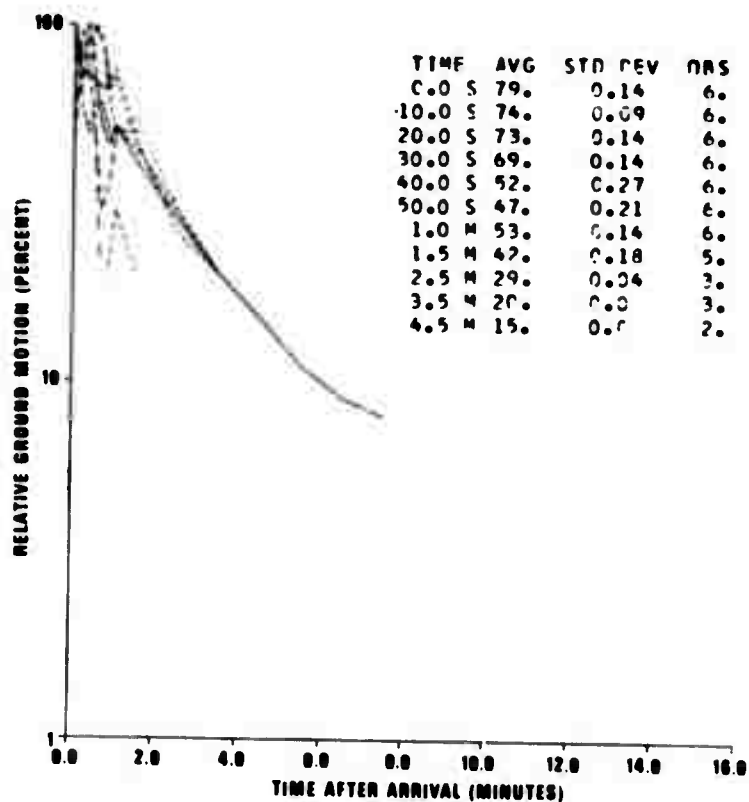


Figure 246. P coda characteristics, Tadzhik-Hindu Kush, DAV.

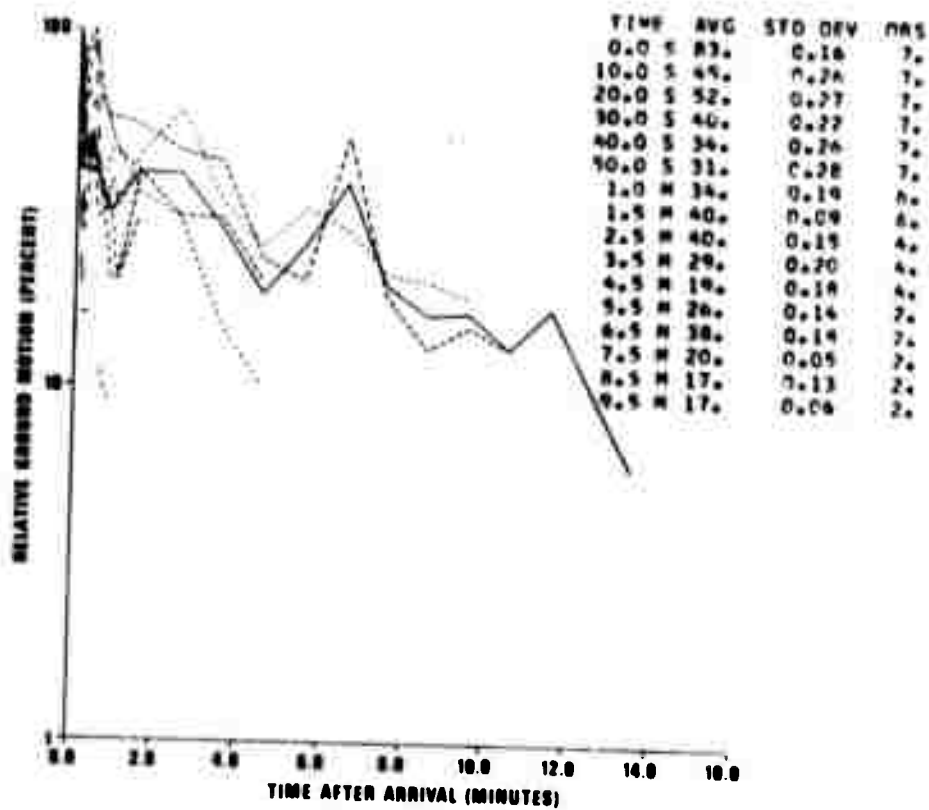


Figure 247. P coda characteristics, Tadzhik-Hindu Kush, IST.

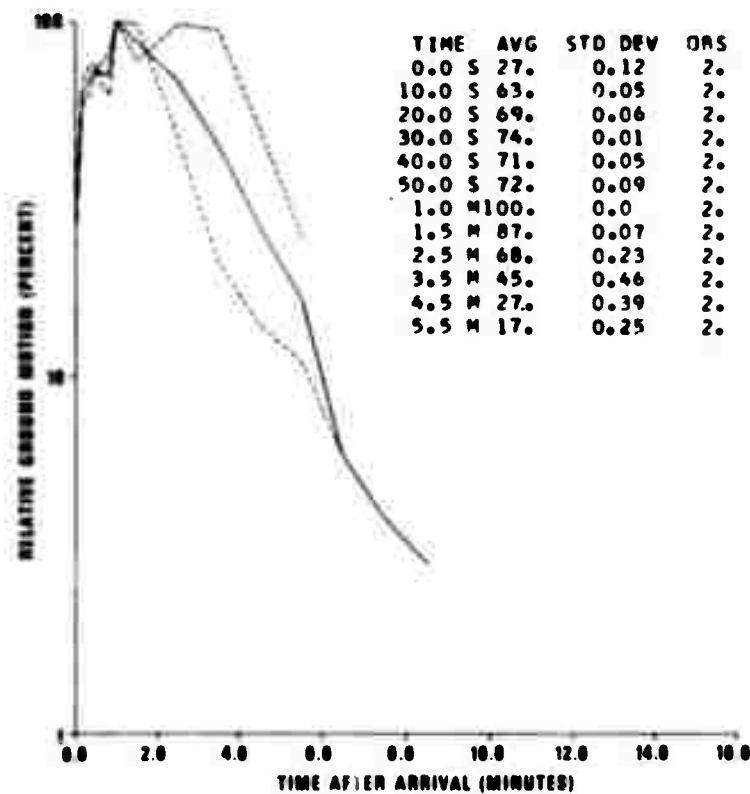


Figure 248. P coda characteristics, Tadzhik-Hindu Kush, KBL.

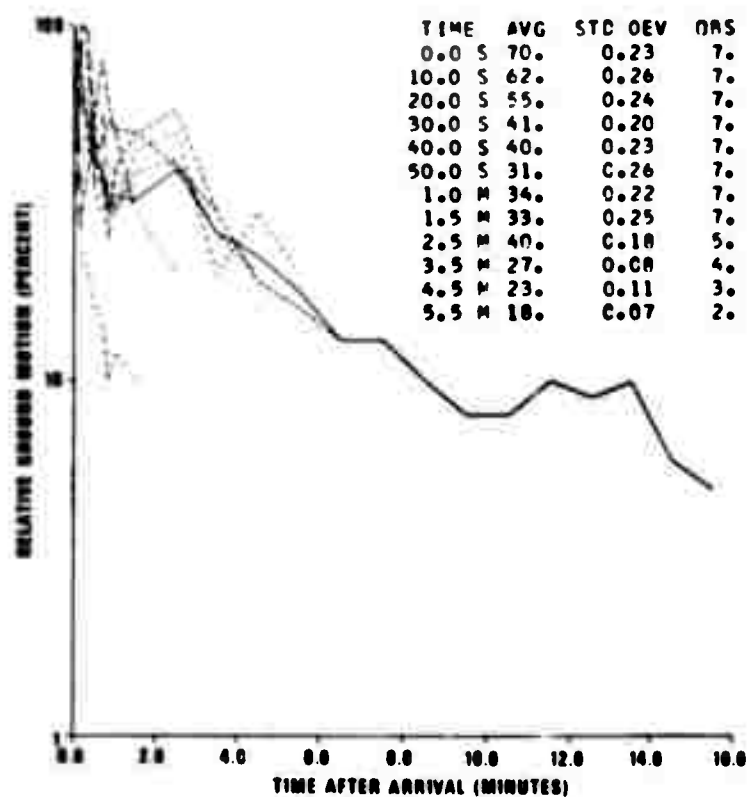


Figure 249. P coda characteristics, Tadzhik-Hindu Kush, KON.

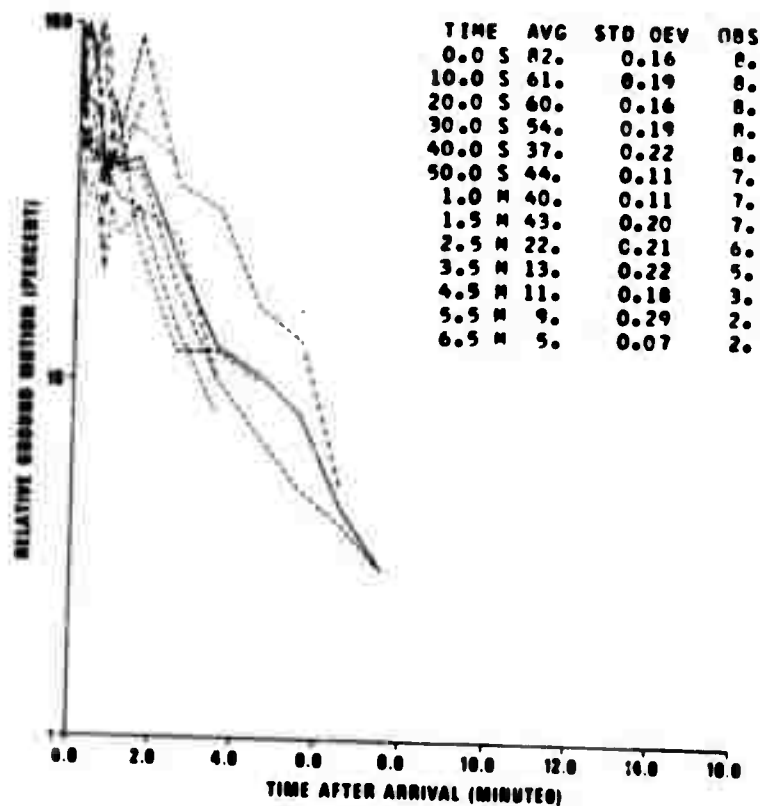


Figure 250. P coda characteristics, Tadjhik-Hindu Kush, MAL.

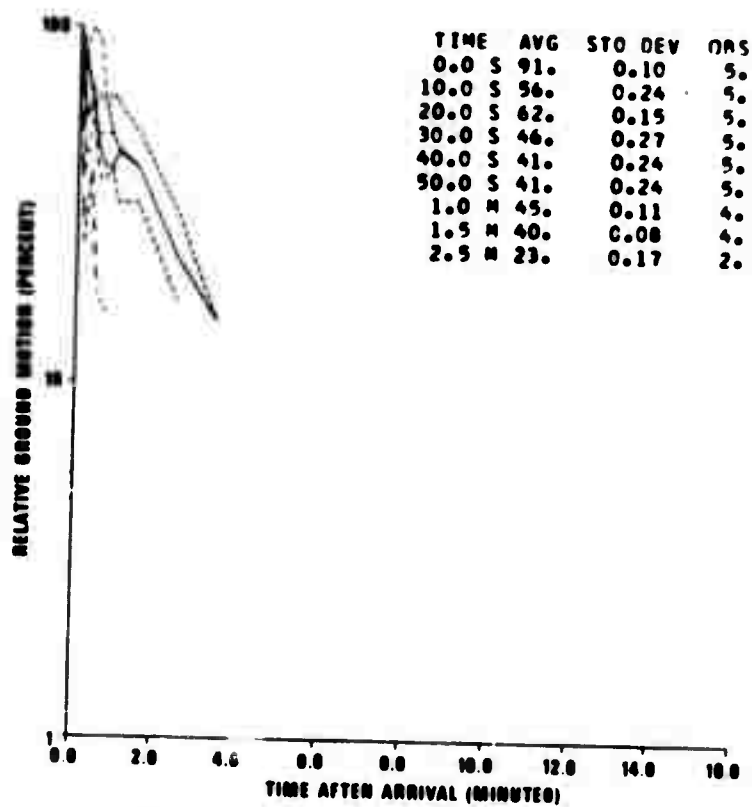


Figure 251. P coda characteristics, Tadjhik-Hindu Kush, MAT.

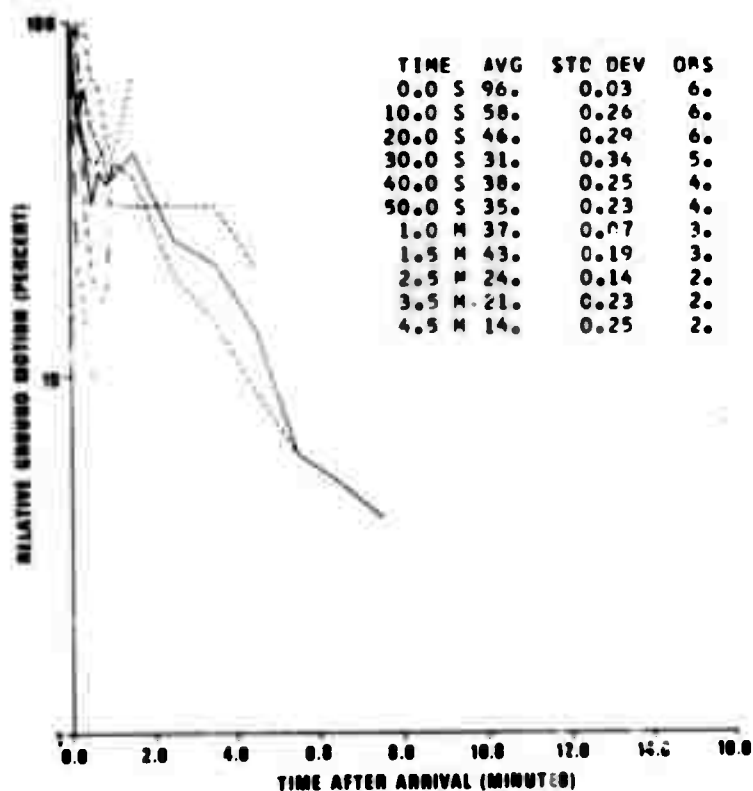


Figure 252. P coda characteristics, Tadzhik-Hindu Kush, MUN.

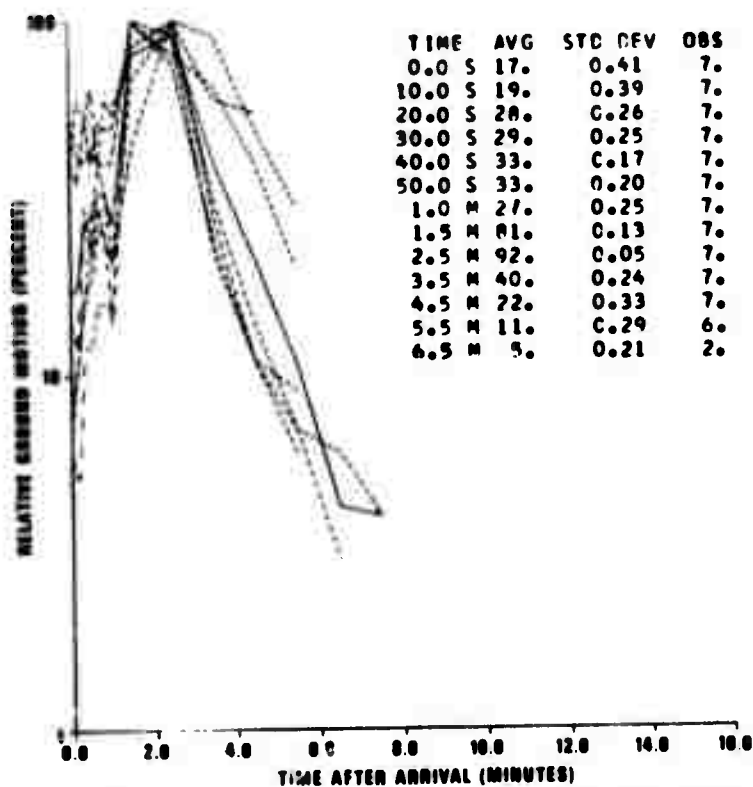


Figure 253. P coda characteristics, Tadzhik-Hindu Kush, NDI.

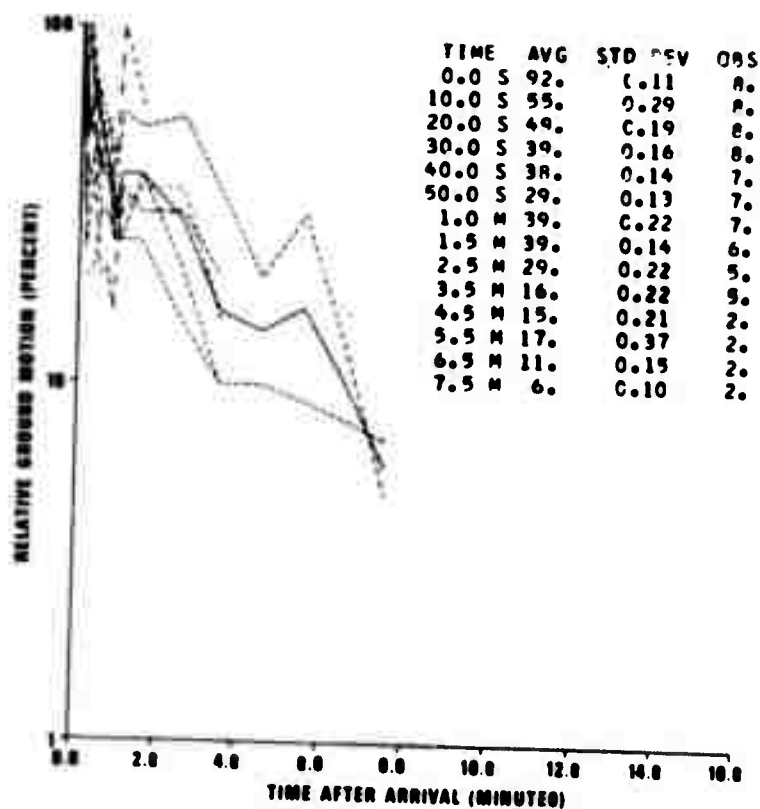


Figure 254. P coda characteristics, Tadzhhik-Hindu Kush, SEO.

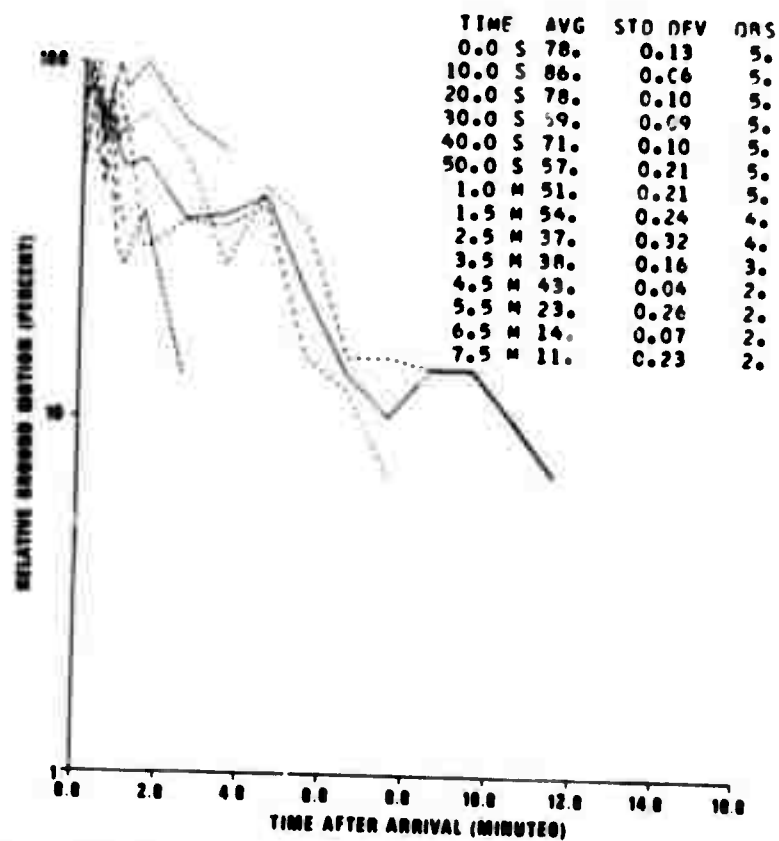


Figure 255. P coda characteristics, Tadzhhik-Hindu Kush, SHI.

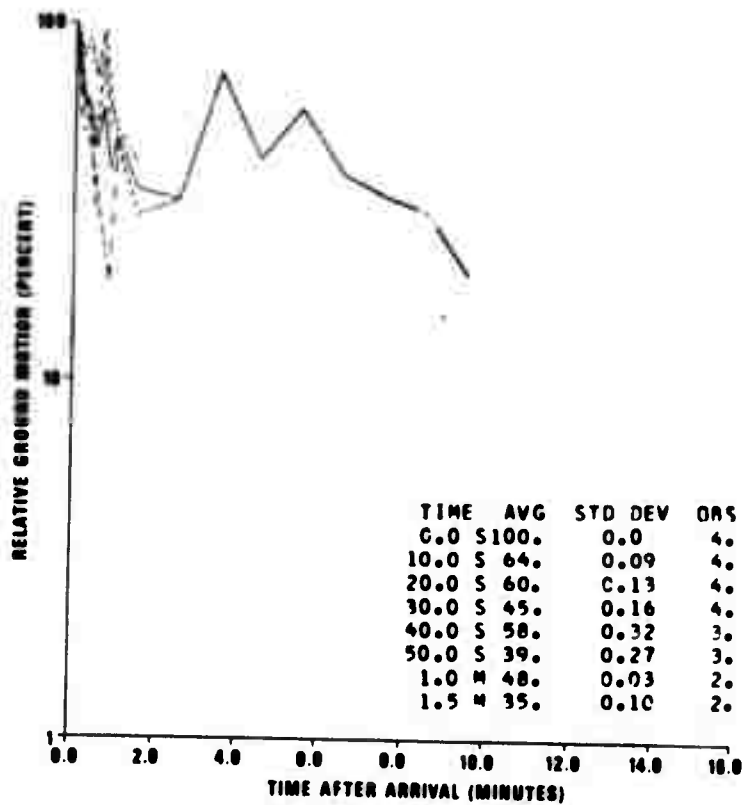


Figure 256. P coda characteristics, Tadzhik-Hindu Kush, WES.

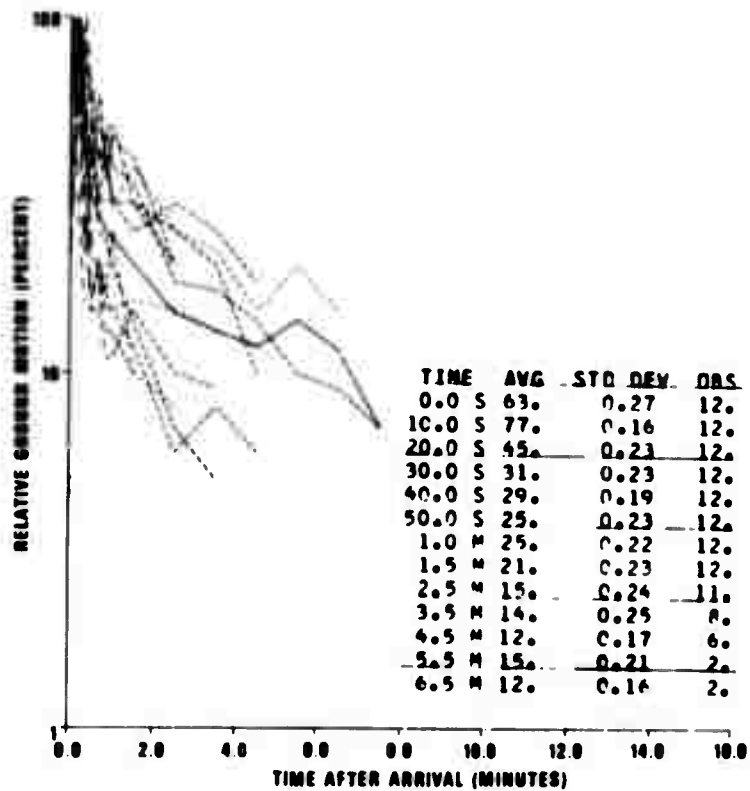


Figure 257. P coda characteristics, China-Nepal-Burma, ADE.

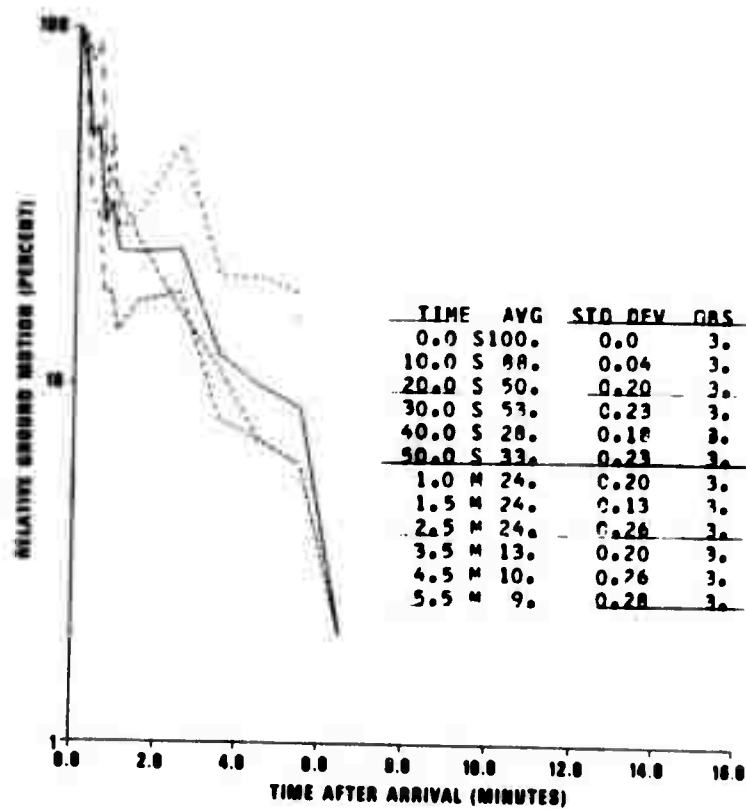


Figure 258. P coda characteristics, China-Nepal-Burma, AQU.

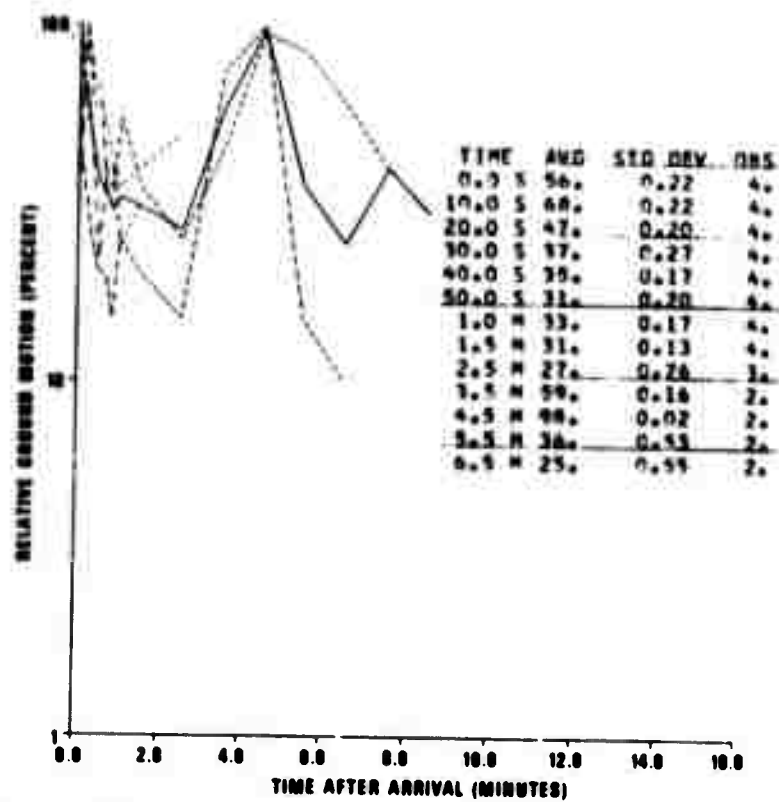


Figure 259. P coda characteristics, China-Nepal-Burma, ROZ.

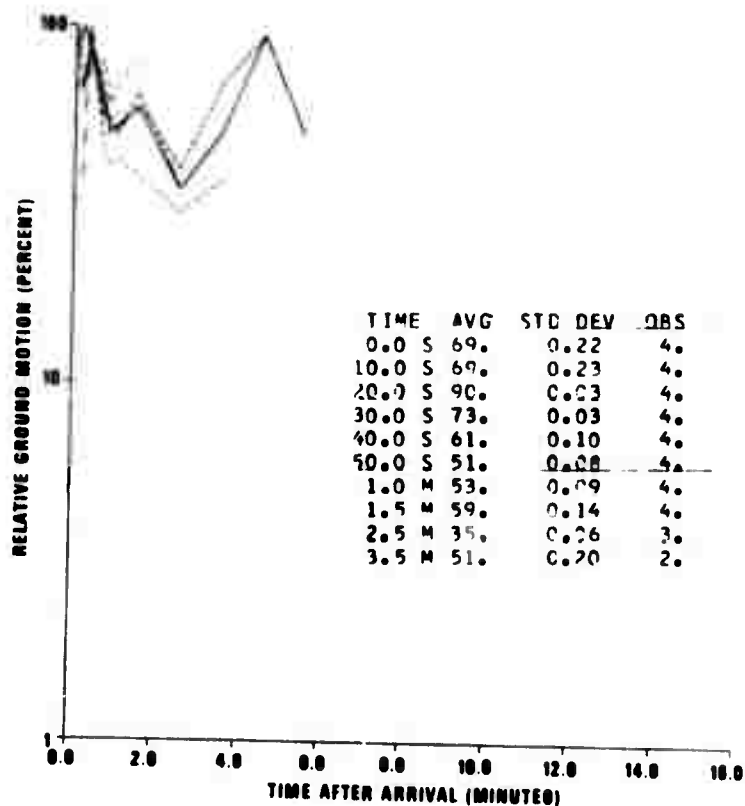


Figure 260. P coda characteristics, China-Nepal-Burma, CHG.

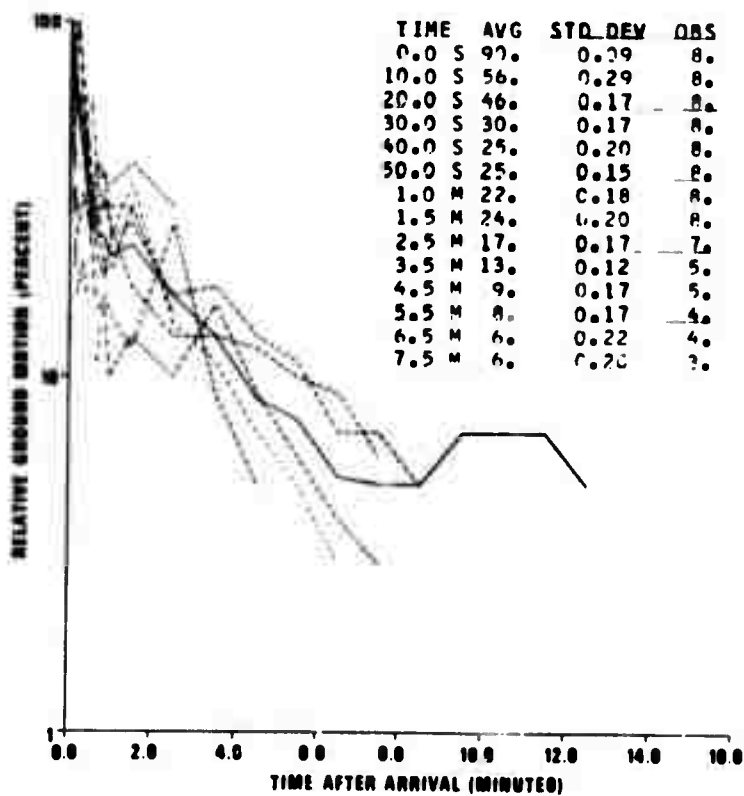


Figure 261. P coda characteristics, China-Nepal-Burma, CMC.

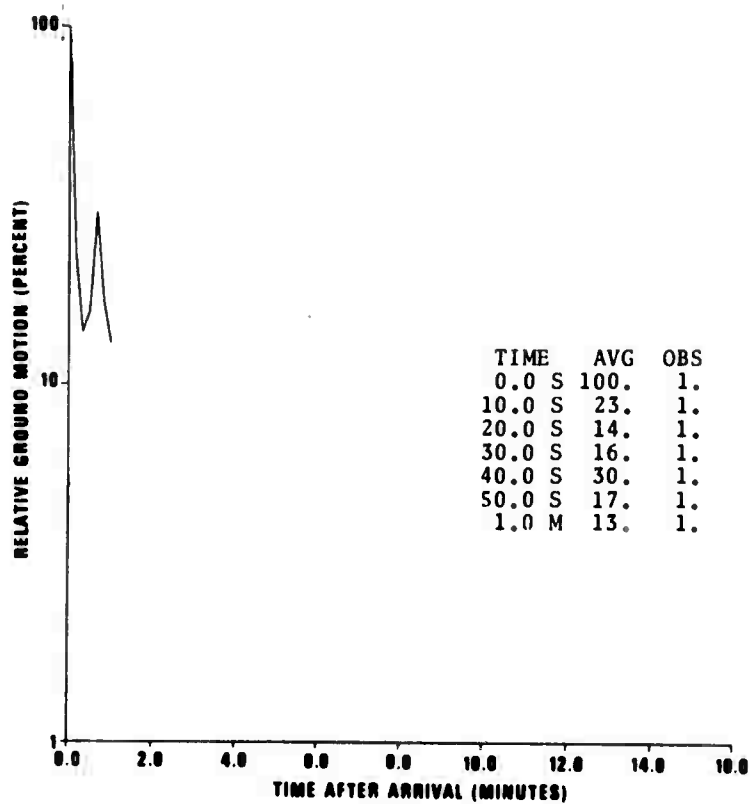


Figure 262. PKP coda characteristics, China-Nepal-Burma, DAL.

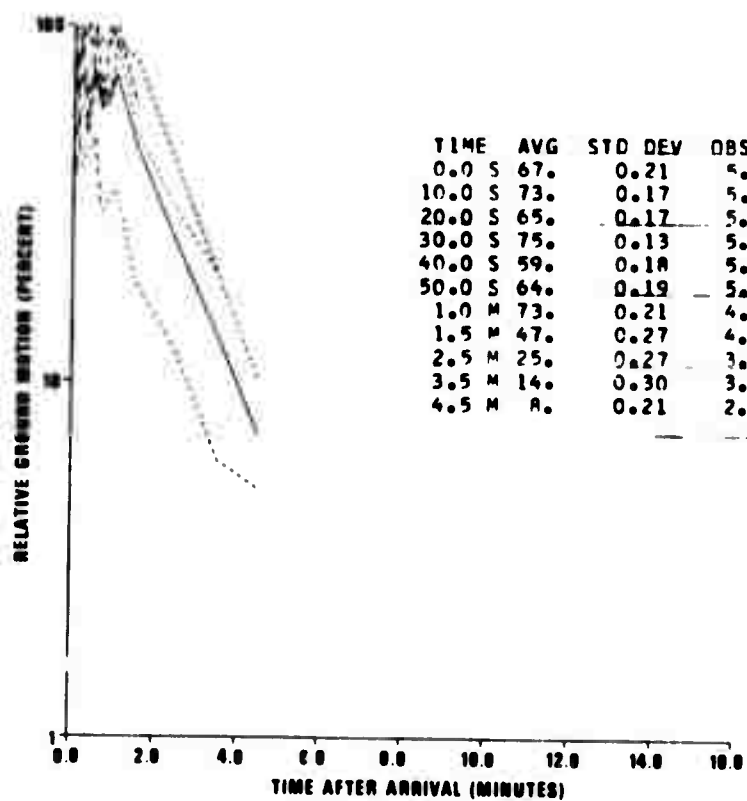


Figure 263. P coda characteristics, China-Nepal-Burma, DAV.

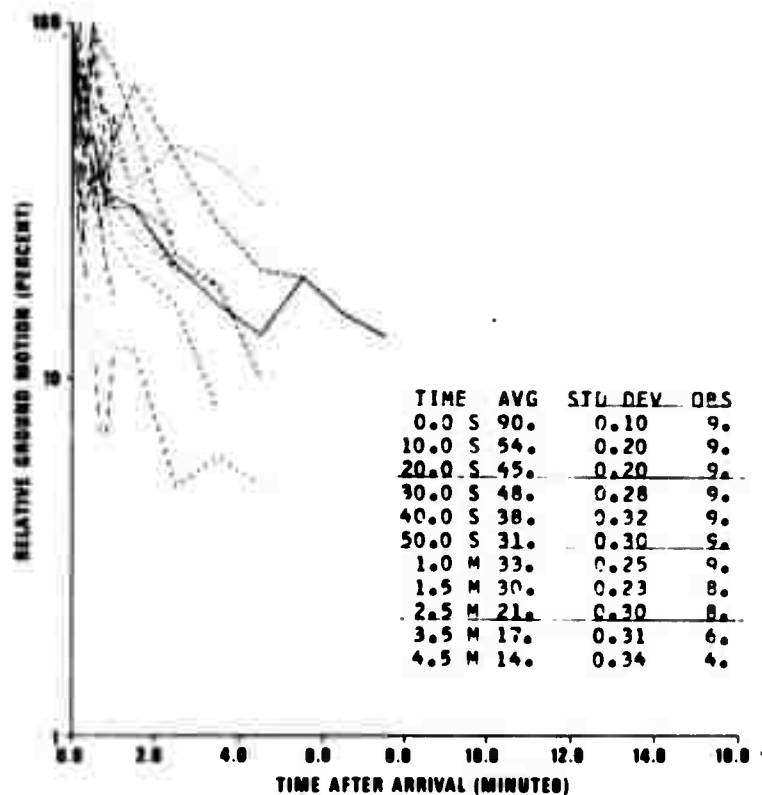


Figure 264. P coda characteristics, China-Nepal-Burma, IST.

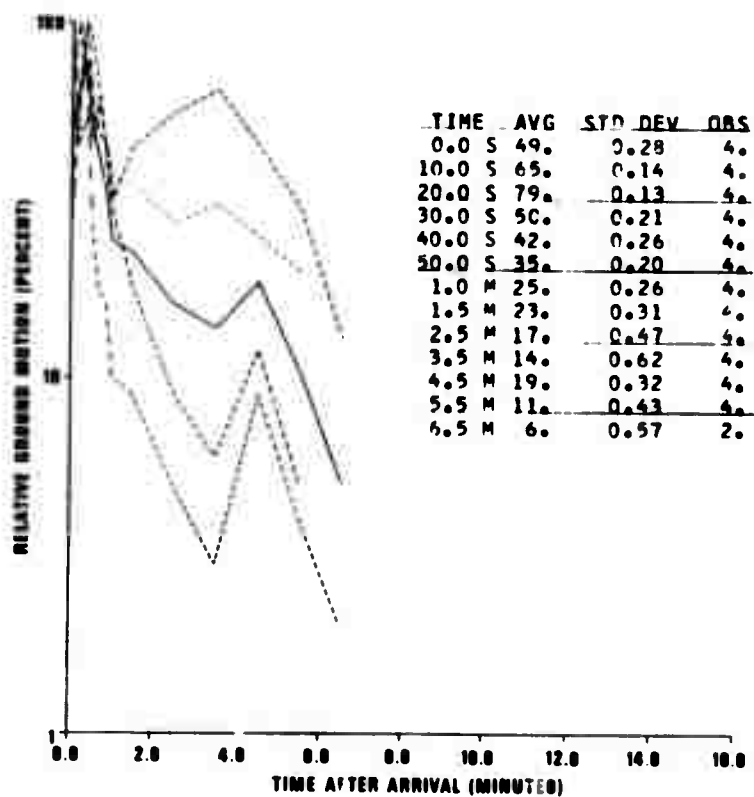


Figure 265. P coda characteristics, China-Nepal-Burma, KBL.

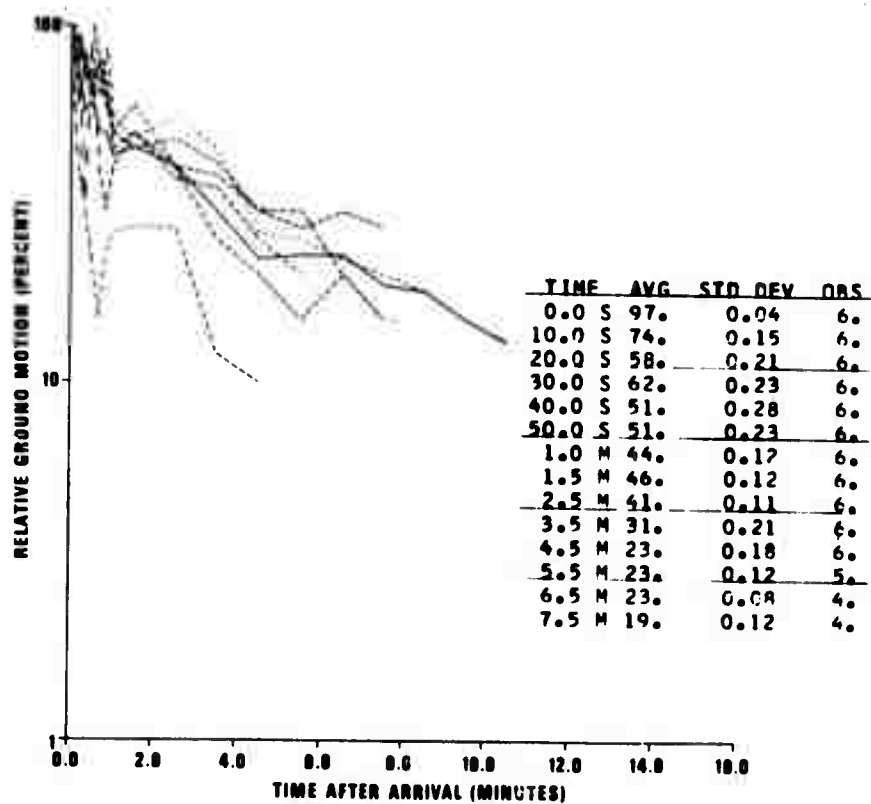


Figure 266. P coda characteristics, China-Nepal-Burma, KON.

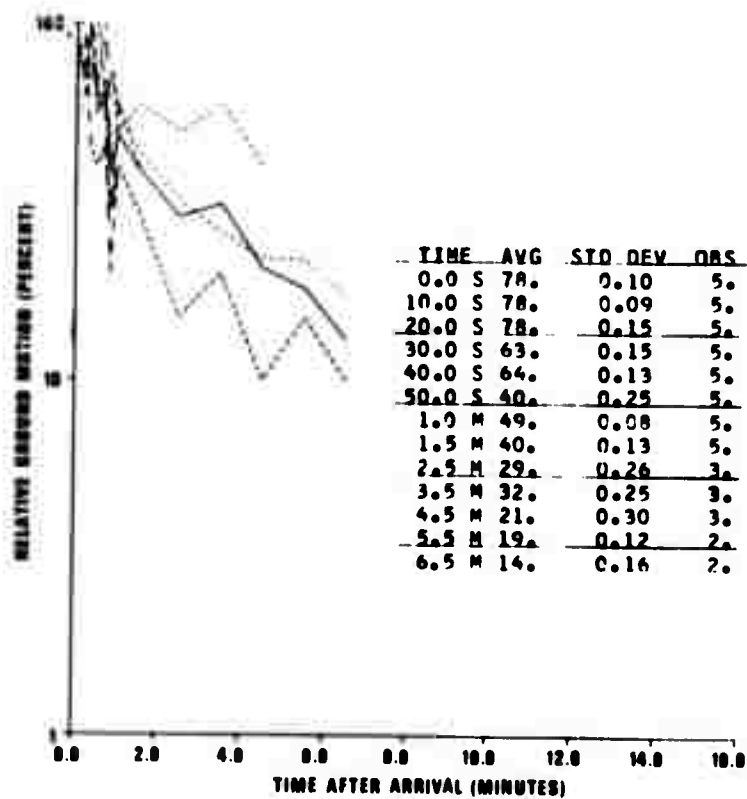


Figure 267. P coda characteristics, China-Nepal-Burma, MAL.

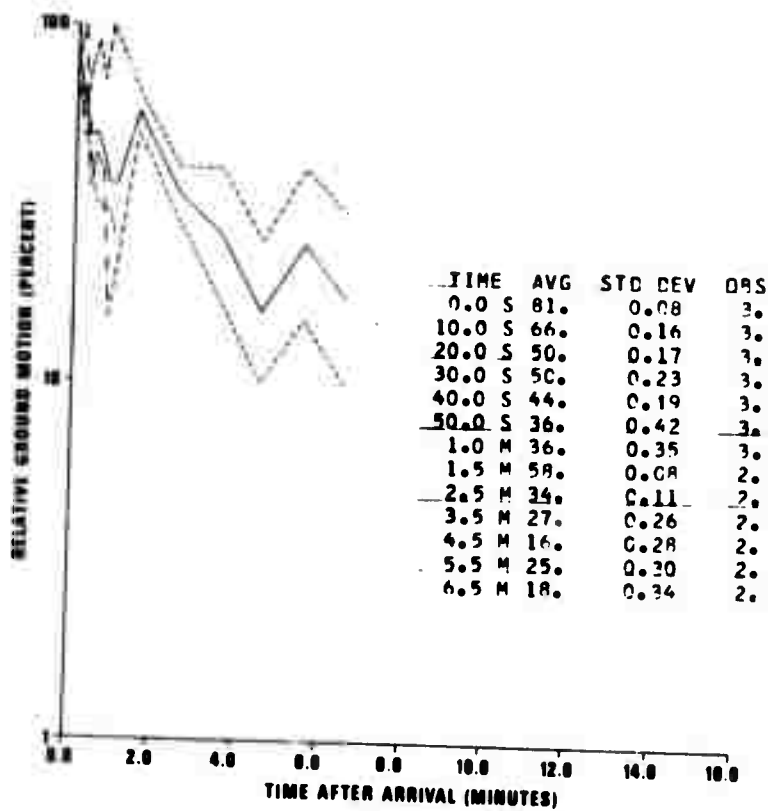


Figure 268. P coda characteristics, China-Nepal-Burma, MAT.

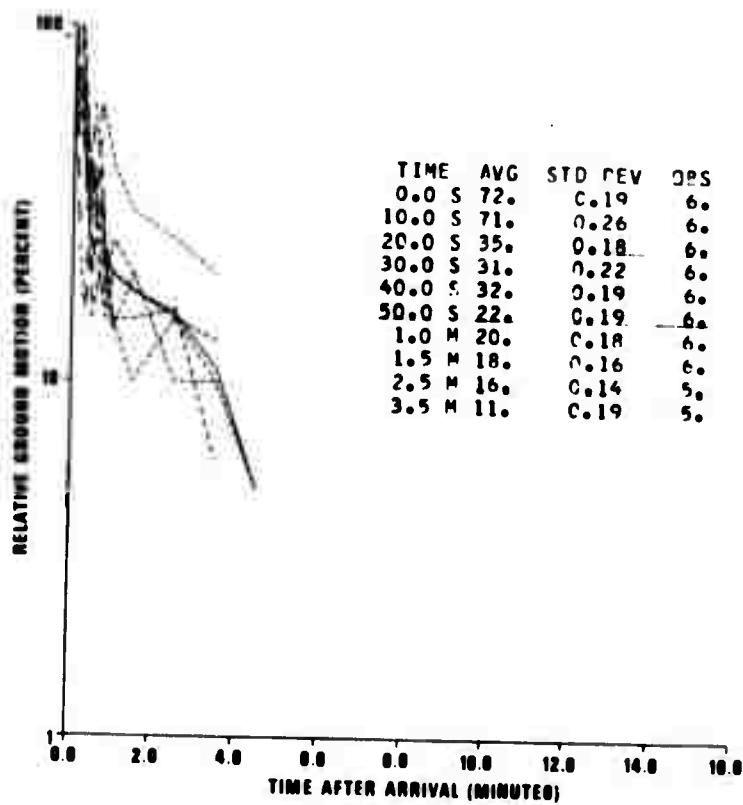


Figure 269. P coda characteristics, China-Nepal-Burma, MUN.

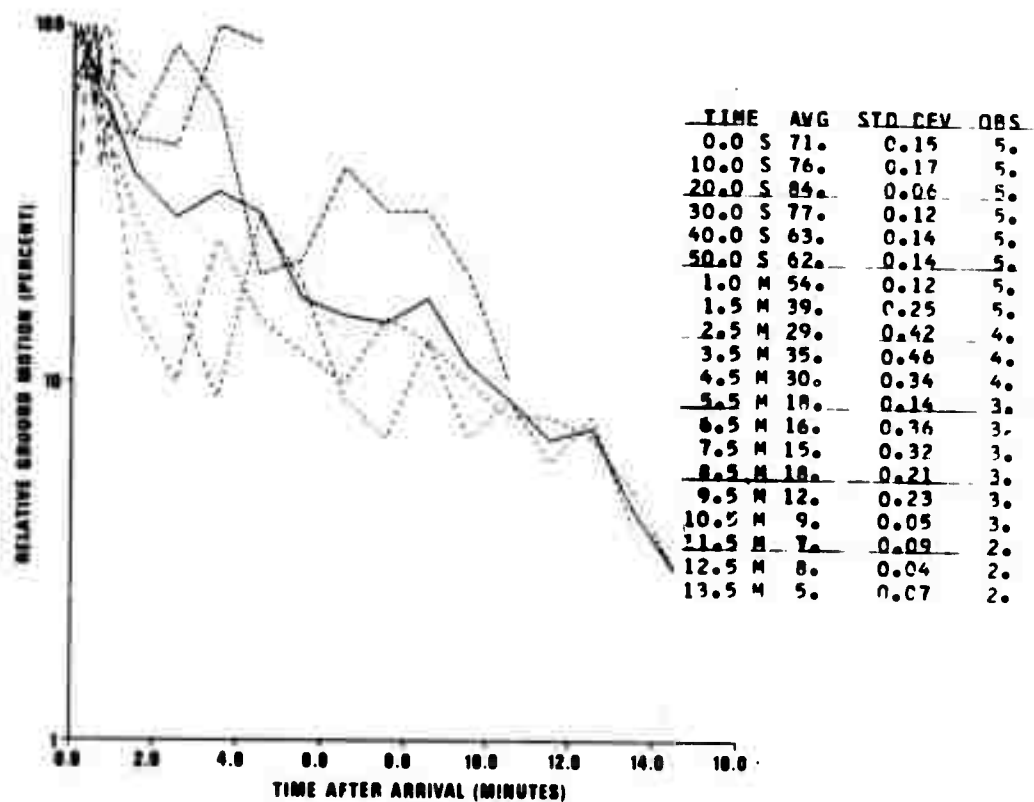


Figure 270. P coda characteristics, China-Nepal-Burma, NDI.

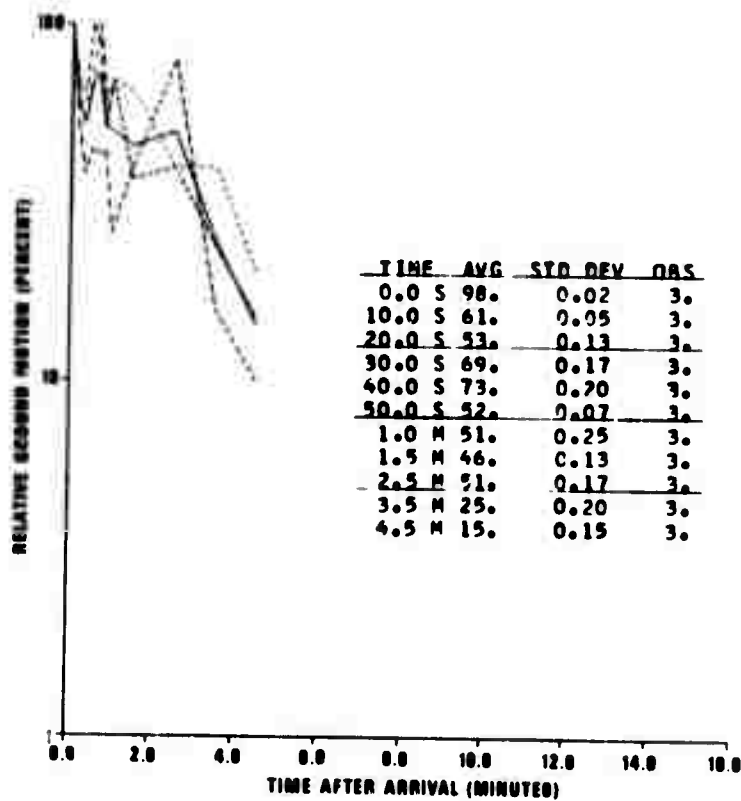


Figure 271. P coda characteristics, China-Nepal-Burma, SEO.

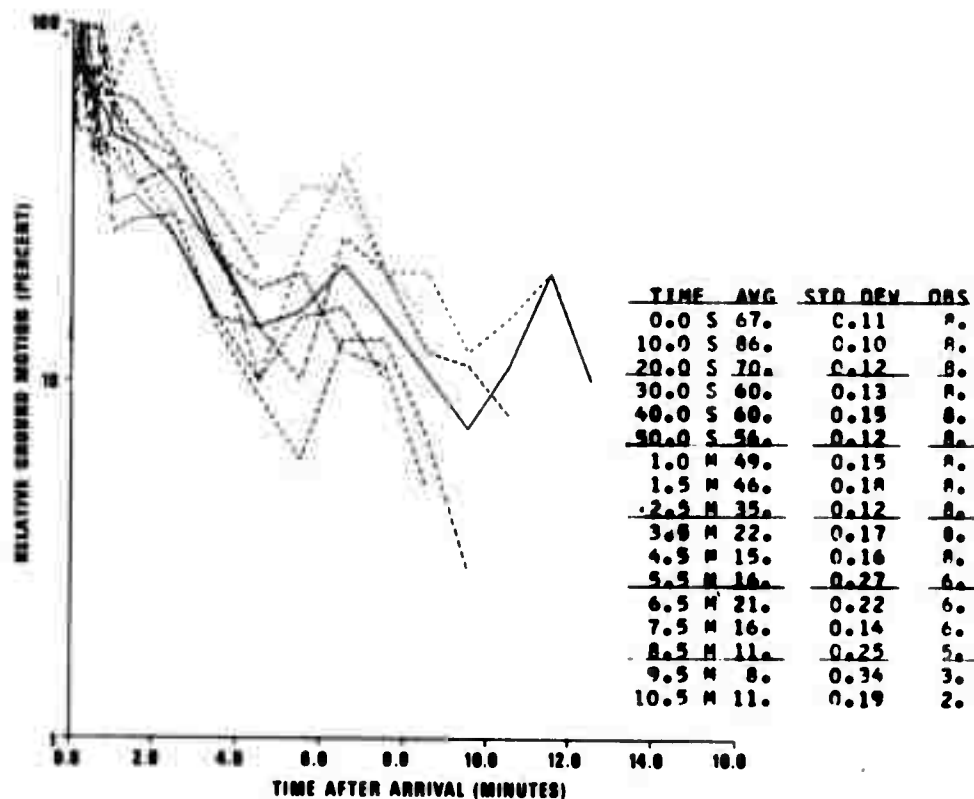


Figure 272. P coda characteristics, China-Nepal-Burma, SHI.

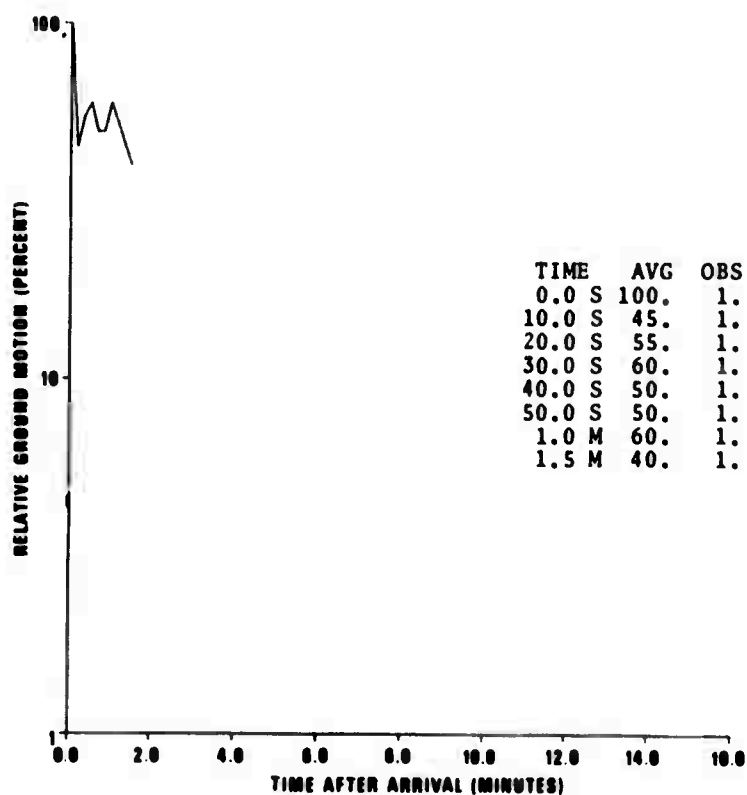


Figure 273. PKP coda characteristics, China-Nepal-Burma, WES.

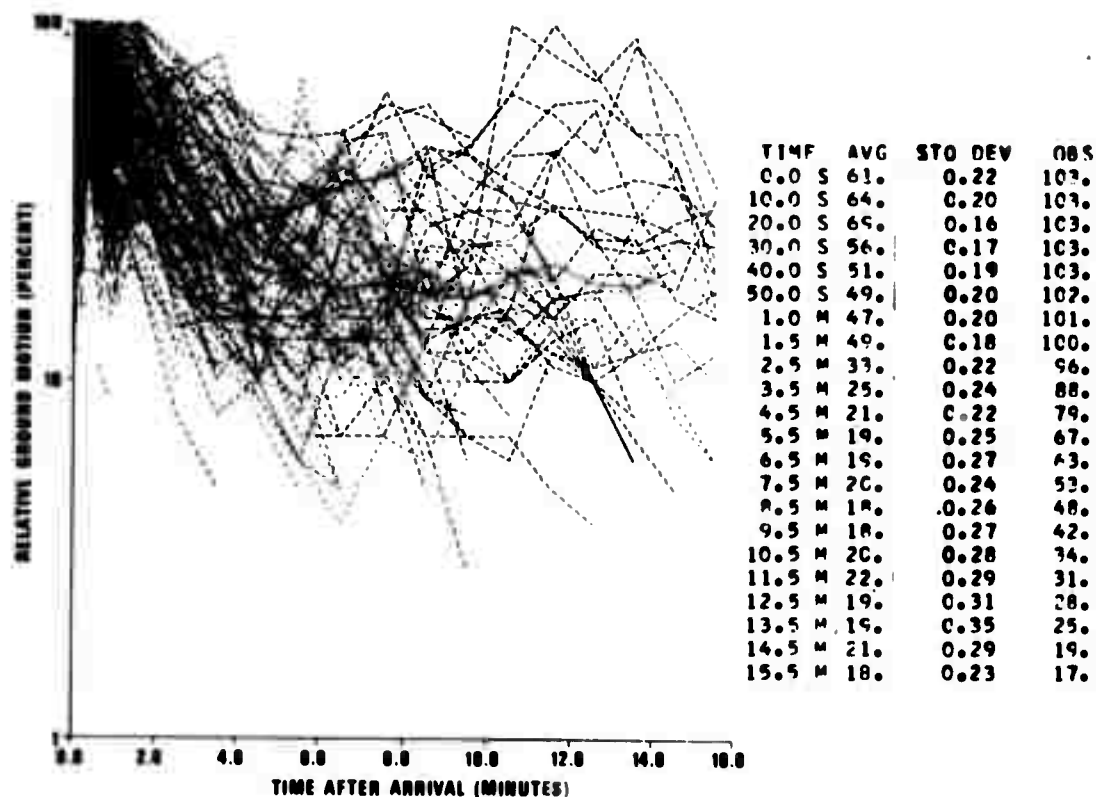


Figure 274. Coda characteristics, worldwide events, 20° to 45°.

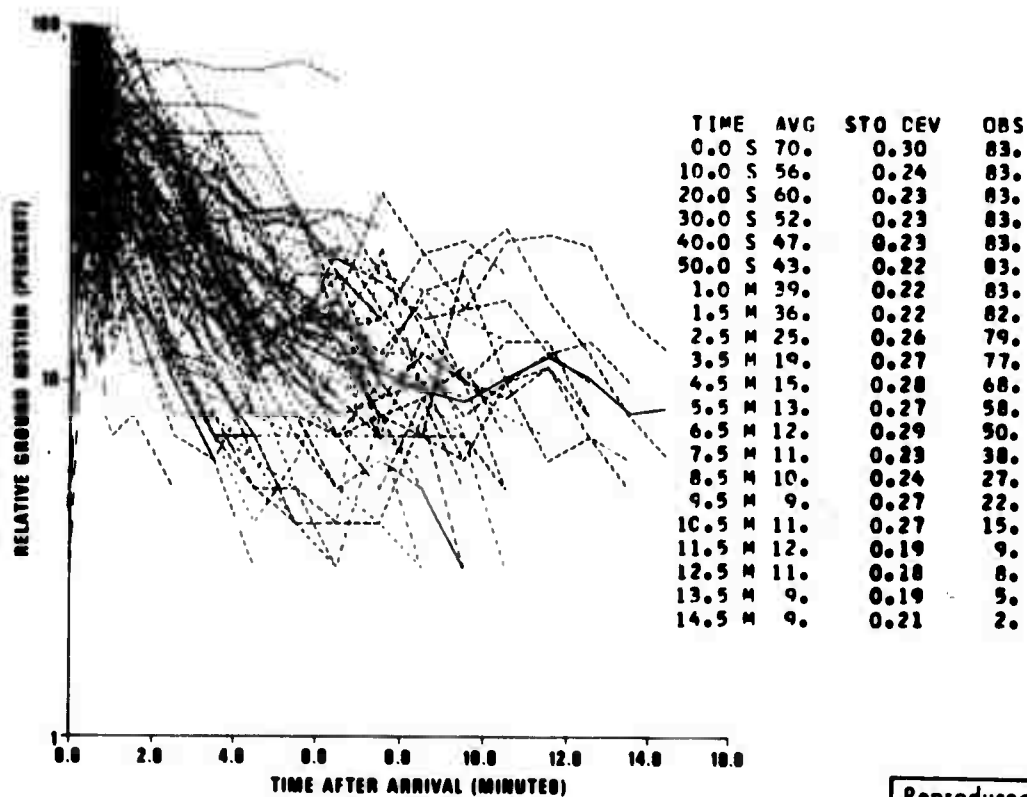


Figure 275. Coda characteristics, worldwide events, 45° to 80°.

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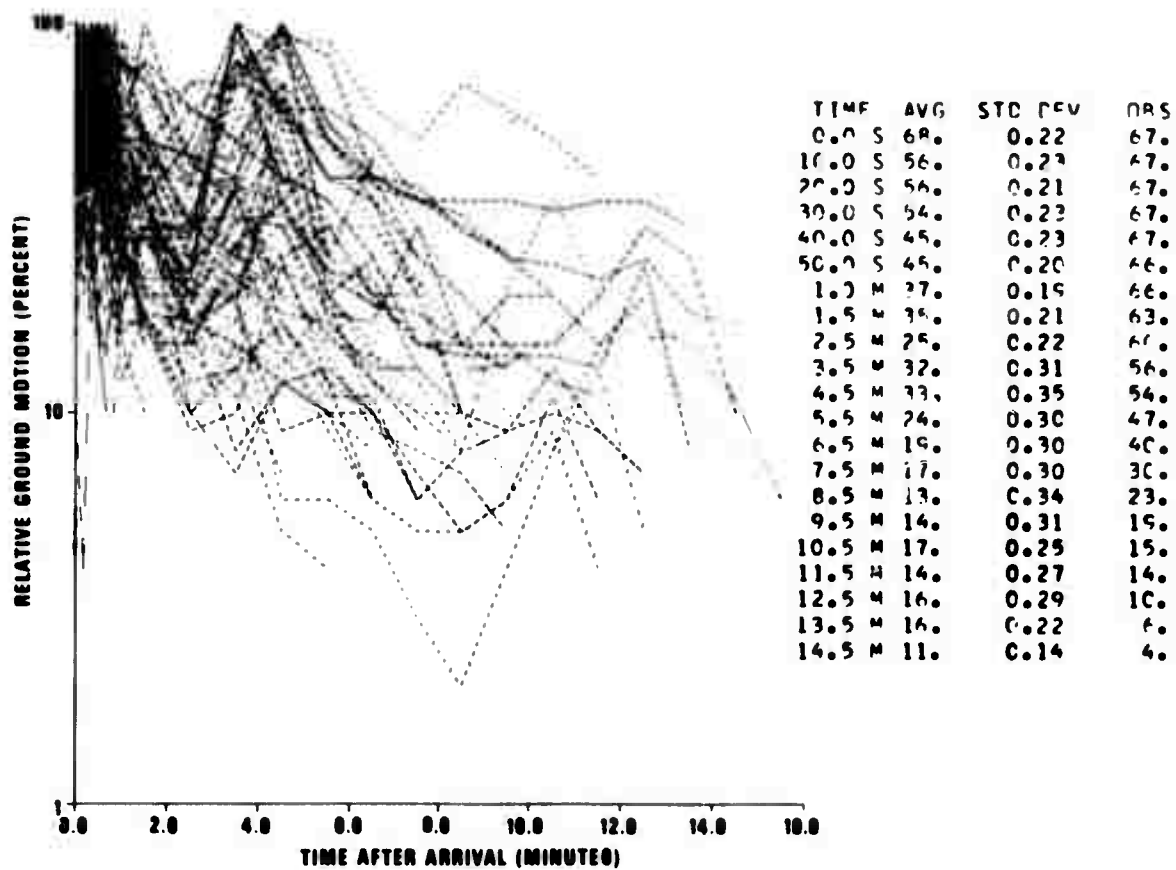


Figure 276. Coda characteristics, worldwide events, 80° to 105°.

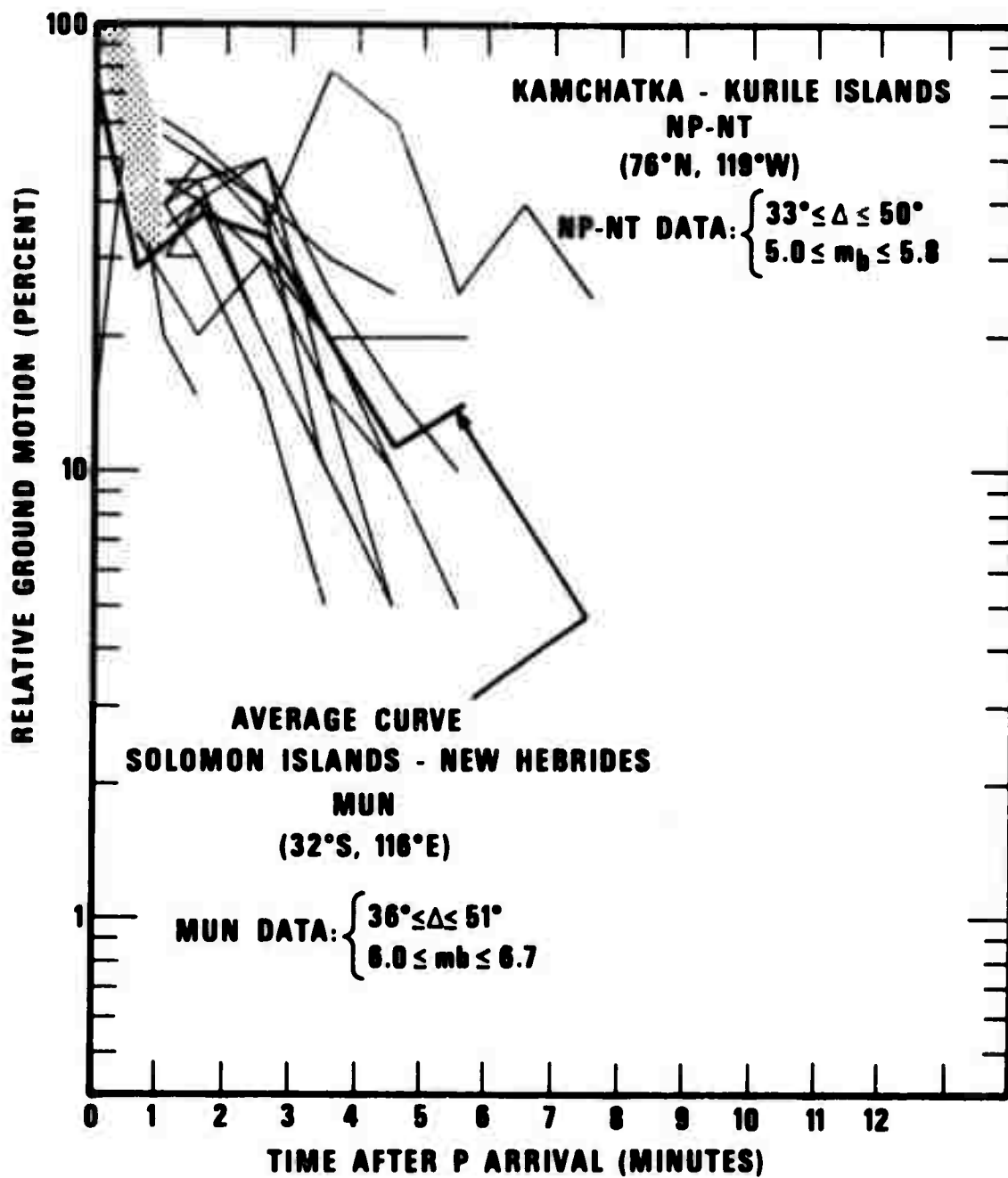


Figure 277. P coda characteristics, Kamchatka-Kurile Islands ($5.0 \leq m_b \leq 5.8$), NP-NT.

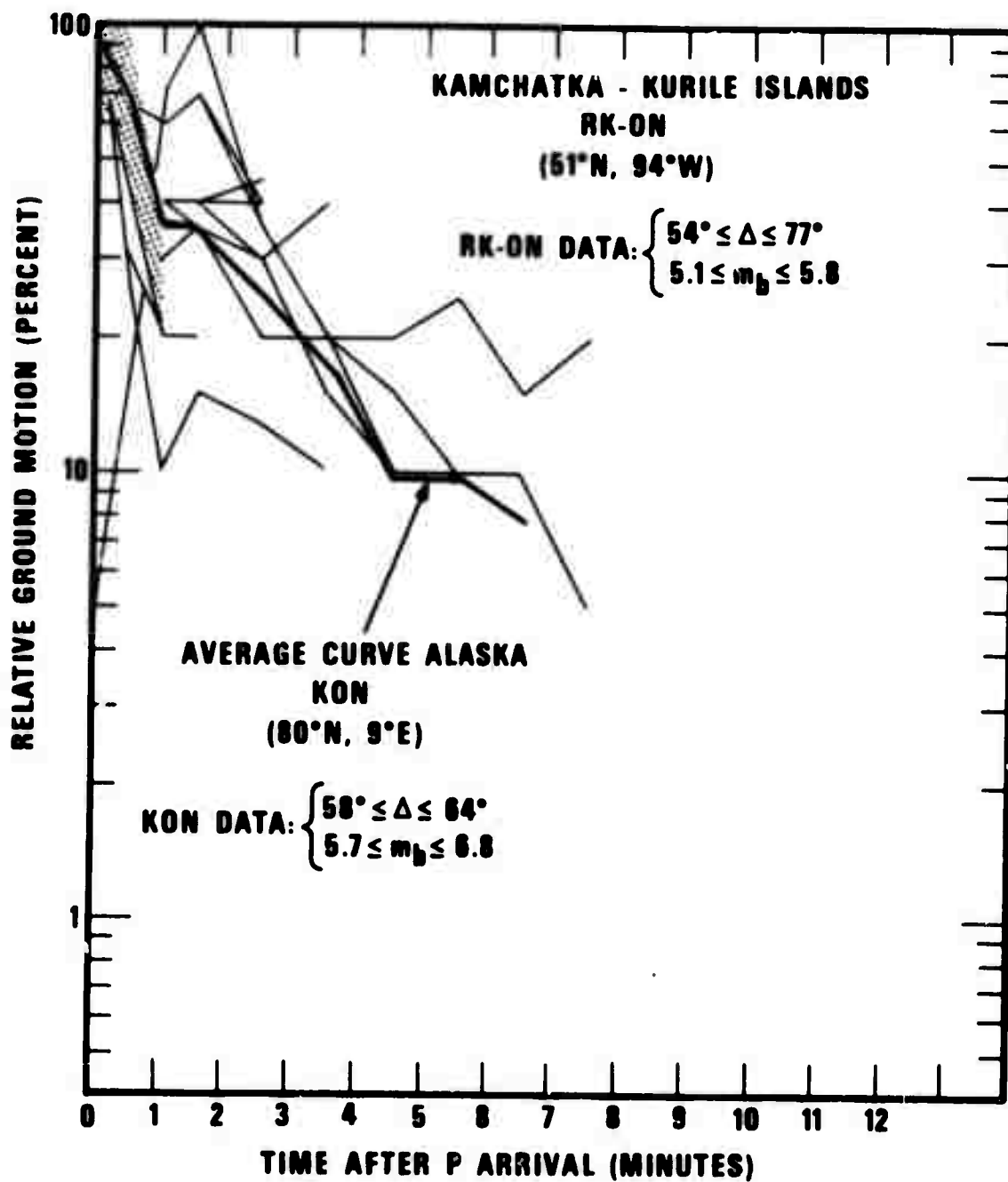


Figure 278. P coda characteristics, Kamchatka-Kurile Islands ($5.0 \leq m_b \leq 5.8$), RK-ON.

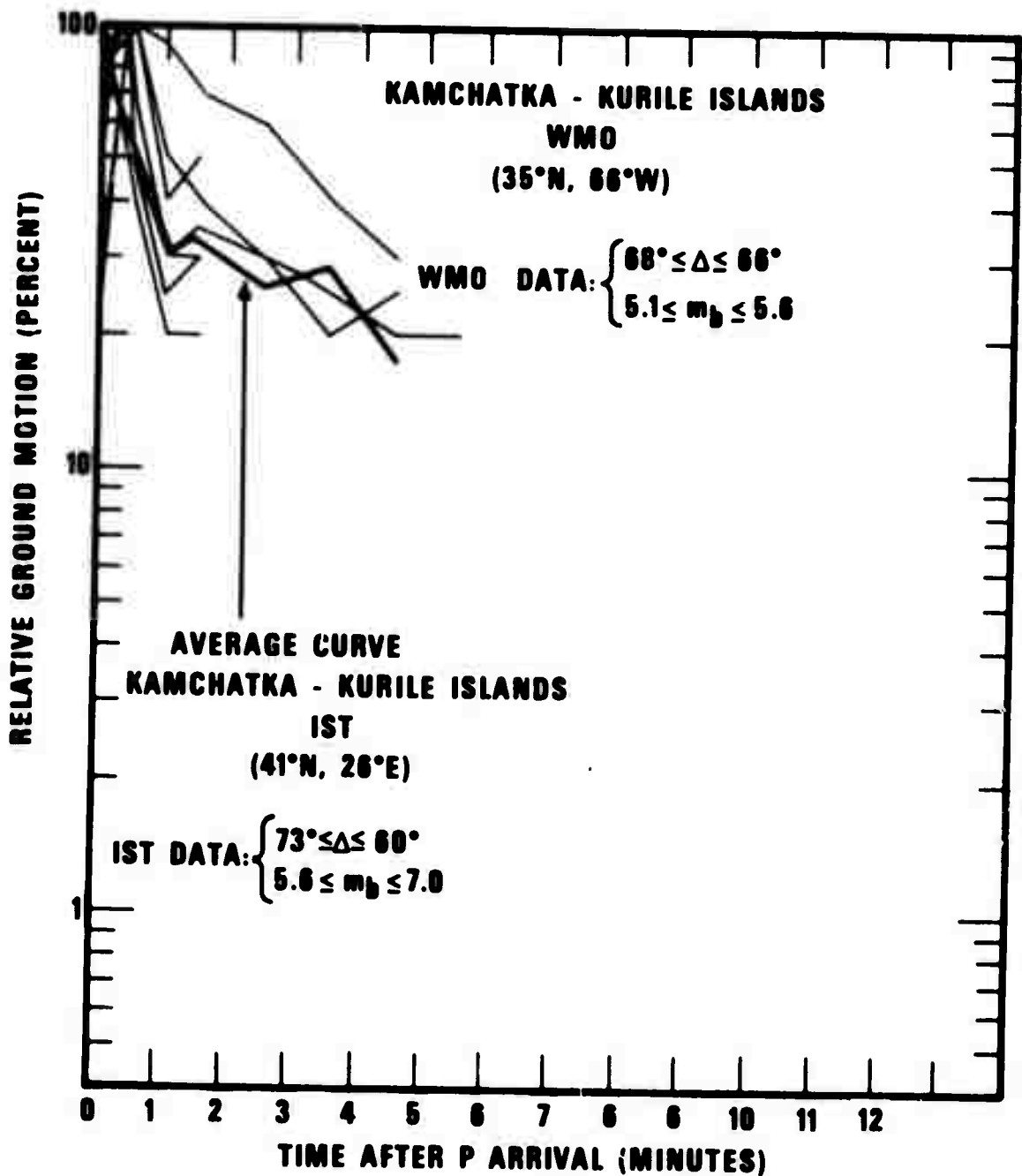


Figure 279. | P coda characteristics, Kamchatka-Kurile Islands ($5.0 \leq m_b \leq 5.8$), WMO.